The Magazine for Amateur Radio and Computerists

73

August, 1987
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The perfect emergency packet station!

A Tuning Meter for HF Packet

How to use your monitor as a tuning meter

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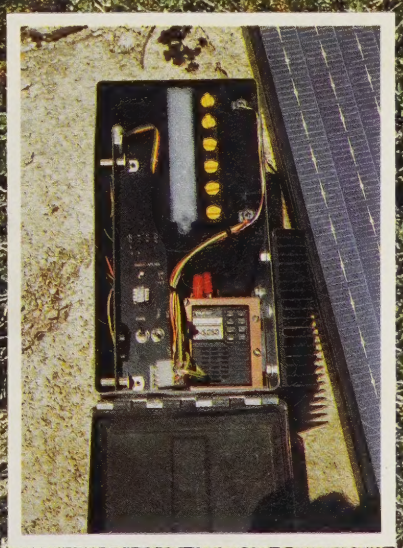

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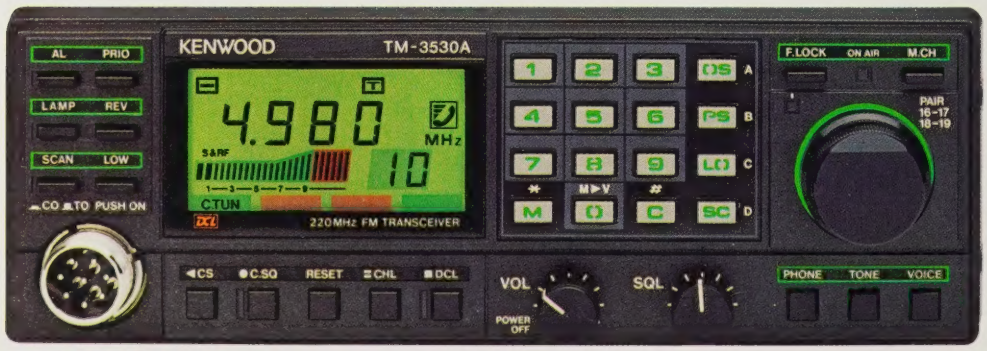

TM-3530A optional accessories:

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DOWN switch
- **MC-43S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
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- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

TH-31BT with DTMF pad shown. Optional RA-9A attached.

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You have worked very hard in getting your NOVICE TICKET. The road ahead must seem to be almost unobtainable, but it isn't, with the proper information. That is where CTM Magazine can help. CTM is the only magazine dedicated in bringing you information on how your home computer can give you many hours of enjoyment when used with your ham equipment. We are also the Number One Source of PACKET Information.

To assist you in learning more about your newly found hobby, just send this page along with a copy of your novice ticket and we will send you a FREE copy of CTM. In fact, send us a copy of your upgraded ticket and we will send you another FREE copy or add an EXTRA MONTH to your subscription.

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Tell them where you saw it!

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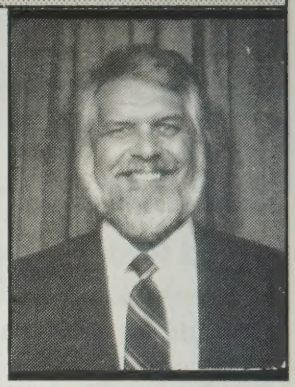
(An Editorial and just plain talk)

Chet's Chats



Chet Lambert
W4WDR

CTM Reaches Credibility

At the Atlanta Hamfest, W2JUP, Norm Sternberg came by the booth and told me that **CTM** had reached credibility at least in his part of the country, New Jersey. When amateur magazines are discussed, **CTM** are in there along with the other four.

I was pleased to hear that comment, since credibility has been our strongest goal since we started May 1, 1981. I will fully concur with his accessment when reading in the other "four" I see a statement talking about the *"other four"*. If and when that comes about, then I feel we have made our point.

Without credibility, we are nothing. It was my firm concern that credibility be established early. I want people i.e., subscribers, readers and other companies to know that when they see it in print in **CTM** "It is fact". Many companies read my evaluations of hamfest and computer shows with more than just casual interest. They take my words as fact and many will and do make their decisions as to whether to go to a hamfest or computer show based on my "words".

About 4 to 5 years ago, Teenie and I attended a computer show in Pompano Beach, Florida. At that time it was the worst computer show we had attended. I wrote it up as such, the publication, it wasn't a real magazine at that time, was published and Teenie read my evaluation and was deeply concerned. Concerned to the point of having me contact Wayne Green. I read Wayne what I had said and to get his valued opinion. He agreed with my accessment and said he was going to basically say the same thing but in fewer words. And, that we didn't have any problem. That made Teenie feel better and that issue was delivered to subscribers.

I was contacted by many companies who ask that I be that "truthful" in all of my evaluations of shows since they would be reading and making decisions based on my comments. As far as I know, many companies still do base their committments to go to, primarily hamfest, since most computer shows have fallen by-the-wayside.

Due to my truthfulness and opinion of shows, I antagonize many. It is natural for hamfest committees and volunteers who have worked so hard to present a show/hamfest which will go down in their history books "as the best ever", get upset when I come along and say otherwise in the pages of **CTM.** But, many if not most of my comments are not my alone. I get inputs from other company owners and workers who put up with some of the going-ons at hamfest. They come to me because of my known truthfulness, credibility if you will.

Recently I have upset two such groups, those of my own club as concerned the last BirmingHAMfest and those in Atlanta concerning the recent ARRL National Convention.

I also upset the Orlando club prior to the last Orlando Ham-Cation where I said I wasn't expecting much from their hamfest. As it turned out, it was a much better show than I had anticipated. I had to "eat my words" if you remember.

This year the Atlanta Hamfest was also better than I had anticipated. See my review of that hamfest later in this article.

Norm, thanks so much for coming over to the booth and talking to me and letting me know of our current status. I do appreciate it. . .

T-S Horizons Mailing List

Some of you have aready been placed on the **CTM** mailing list. Others will be added as time permits. It is a time consuming task We, (no Jim Pittman and Glen Popiel) are moving our mailing list over from the KayPro 10 in CP/M dBase II over to one of the PC MS/DOS in dBase III. That too, takes time.

Those of you who had up to 6 months left of *T-S Horizons* will be getting up to 6 months of **CTM.** If you had three issues left you will get 3 issues of **CTM.**

I just don't have any idea just when they will start because of all the things going on. Once you are on the list, you will get an issue each month until the time runs out. And, at that time I sincerely hope you will subscribe to **CTM.**

Tell them where you saw it!

When Renewing your subscription

Please include your last mailing label. It sure takes time to search for you. The number in the upper right corner lets me know your position on that particular months mailing list. When the conversion is made, it won't be as important, but, for now it is.

Moving and Changing Addresses

Please send in your change of address to me. It costs us both when you don't and **CTM** is delivered to an empty building.

I had a call the other day from a subscriber who had moved several months ago and called and wanted to know why he hadn't received his **CTM** during those months. He said the post office people said they would take care of it. That, I had never heard of.

I just called our main post office here in Birmingham, and here is what they told me. Since I mail **CTM** 3rd class they will send me a notice the first time a person has moved, if I have *"Address Correc-tion Requested"* which cost me $.30 each. And, if I was mailing 2nd class, they would forward magazines for two months and on the third month, they would send me a change of address if I had the above information requested. But, they said it was still the persons responsibility to contact all of their correspondents, magazines especially because of weight.

So if you are planning on moving, please let me know immediately, so you won't miss a single issue. I just can't supply you copies of the missed issues because I didn't get notified.

Still trying to get "On the Air"

Jim Pittman, KA4PDZ and I are working on getting my new Mosley PRO 67 antenna up. I really miss getting on the air and talking to my hundreds if not thousands of friends. It would be so good to get a little relaxing done each week or may be even each day by getting back on frequency.

Remember I told you I won the 2nd prize at our BirmingHAMfest this year, but since I have so many 2 meter rigs, I just didn't need another. So I traded it back to Larry down at Ack Radio and am using the value up on getting my antenna up. I am putting up another 10' of Rohn 25 tower and a new top section with a thrust bearing. Hopefully I can be on the air within a month or so, surely before winter.

PRM or CTM - Which?

Last month on page 58 I had a FLASH announcement about the possibility of me taking over *PRM (Packet Radio Magazine).*

During the Atlanta Hamfest I met with the South-Net group and expressed my interest in taking over *PRM*. There was one state not represented but those attending were: Alabama, Florida, Mississippi, Lousianna, Georgia. South Carolina was the state not represented if I remember correctly.

What I proposed was:

To allow those states with statewide packet organizations to use **CTM** as their voice in the printed form. Their inputs would be virtually untouched by me, and they would be able to have their input as they are now doing in the pages of *PRM*.

To simplify matter, subscriptions would start each January. And partial subscriptions would be accepted until January 1988. At that time they would provide me a total listing of their members on their stationary, along with one check to cover the cost of **CTM** at a reduced rate. (States belonging to South-Net or others now receiving *PRM* are encouraged to contact me for full details concerning costs)

They would benefit in may ways i.e., not only would they be getting the packet information from their own state and the others in the association, but they would be getting additional packet information from our other packet writers. Also, they would be getting other ham and computer articles. Therefore, it is my opinion they would be foolish not to join the **CTM** family.

Currently the participating organizations are:

ALA-NET - Alabama Packet Radio Association

CAPRA - Chicago Area Packet Radio Association

FADCA - Florida Amateur Digital Communications Associations

GRAPES - Georgia Radio Amateur packet Enthusiasts Society

KCAPRG - Kansas City Area Packet Radio Group

MAPRC - Mississippi Amateur Radio Digital Assn.

PAPA - Pennsylvania Packet Association

PPRS - Pacific Packet Radio Society

RMPRA - Rocky Mountain Packet Radio Association

TAPR - Tucson Amateur Packet Radio Corporation

UPRA - Utah Packet Radio Association

I am hoping they will soon realize the value of receiving **CTM** as part of their state associations.

Then too, since we have more packet articles than the other four ham magazines each month, it seems to be a natural for the our association.

I will keep you informed.

Read the associated story about Louisiana joining **CTM** as a part of their state association, Louisiana Amateur Packet Radio Society (LAPRS).

CQ Novice Century Club

CQ Magazine announces a new award! Quoting from their release.

CQ is pleased to announce the formation of the CQ Novice Century Club, a new award program intended to encourage activity on the Novice bands. The rules couldn't be much simpler: Novice operators need only to work and exchange QSL cards with one hundred differenct stations on any or all of the Novice bands using any mode. Simply prepare a list of your claimed QSO's on a CQ Novice Century Club Award appli-cations form (available form *CQ)* send a self addressed stamped envelope marked "Novice CC". Have the listed QSL's verified by two Technician Class or higher licenses, and send the application to the CQ Novice Century Club Manager, c/o *CQ Magazine,* 76 No. Broadway, Hicksville, NY 11801. There is

no application fee.That's all there is to it. You'll rec-eive a handsome, numbered cert-ificate attesting to your activity on the Novice bands. It's our way of saying "Welcome, my friend, to the wonderful world of Amateur Radio Operating!"

Novices, they sent a form mentioned above and it is very simple to complete. Go For It!

CQ Magazine also announces the WNZ AWARD

The editors of *CQ* are proud to announce the newest achievement award in a wide array of world-class awards, the WNZ award. WNZ stands for "Worked Novice Zones" and is available only to holders of a U.S. Novice or Technician class license for proof of contact with at least 25 of the 40 CQ Zones as defined by the WAZ Rules. All contacts must be made using the Novice 80, 40, 15 or 10 meter bands, using modes authorized for those bands, and using transmitter power authorized for the Novice and Technician license. All contacts must be made as a Novice or Technician although at the time of submitting the actual application for the WNZ award, the licensee may have upgraded to a higher class of license. Contacts must be made prior to passing the higher grade examination and receiving authorization to operate with General or higher class privileges.

The WNZ award is available as a mixed mode, c.w. only or s.s.b. only award. Rules for the WNZ are essentially identical to the standard CQ WAZ rules. Thus the WNZ award may be used to fulfill part of the application requirement for the WAZ award when the operator is finally able to confirm the remaining 15 Zones.

Welcome to the world of Zone-chasing all you Novices and Techs! Take that first step toward the "big league" awards by writing today for your application and zone map. Join the fun of DXing while competing against your peers.

Congratulations Alan Dorhoffer,K2EEK, Editor and Dick Ross K2MGA, Publisher of *CQ Magazine*. Sure wish I had thought of them. Chet

Authors Photos

A few years back, we ran photos of the writers along with their monthly column. Due to the variety of photos and quality, we discontinued this practice.

Just (7-24-87) received a letter from Bob Hoover, KA6HZF who had an interesting suggestion. I won't go into his total idea but, please send in a small photo of yourself, past, present and future writers. By future, I mean if you submit an article please send along a photo.

The ones I suggest years ago and still use myself (see page 7) are those quick photos which are in most bus stations, discount stores etc. Here in Birmingham I use the one in K-Mart, I get 4 photos for either $.75 or $1.00, I just don't remember.

Just because you had sent in a photo earlier, please don't think I still have it, I don't. I would like to have the photos no later than October.

The reason will become clear soon. . . relatively speaking!

Quantum Computing QL Catalog

Just got a copy of the Quantum Computing QL Catalog and I must say, it is great. Frank Tomay really worked hard on this catalog and is to be congratulated on this fine piece of work. Frank you did good!

Those of you with QL Computers, this catalog is a **must!** You will be doing yourself a dis-service by not getting one.

I couldn't find if there is a charge or not for the catalog, but it wouldn't hurt to include a buck or so. If it isn't needed, Frank would take it off of your first order I bet. Regardless, if you have a QL you need this catalog.

Order yours today from Quantum Computing, Box 1280, Dover, NJ 07801 or call (201) 328-8846. You will be glad you did!

LIST

Someone sent this publication to me. It is a 24 page publication but it says it is a double issue. It is a little better than the typical club news letter. The print varies in type styles and quality. But for those of you who are T/S users, you may want to check into this newsletter. I'm not sure of the cost but the address is LIST, P.O. Box 438, Centerport, NY 11721-0438. It could be what you are looking for.

The DATA EXPANSION

This was another publication sent to me for review. It too, is a T/S users newsletter. It is full of good and useful information on all of the T/S family of computers. The lay-out is two pages on one page of 8 1/2 by 11 inches folded in the middle for a total of 24 pages.

The printing is similar to all or at least most of all the users newsletters with good to poor printing. But, for those of you who want and need more information on the T/S computers, you need to check into this publication too.

David Baulch, Editor apparently works extremely hard in bringing you the kind of information you want and need. He can be contacted at: Fort Worth T/SUG, 4424 Geddes Avenue, Fort Worth, Texas 76017.

David may write for **CTM** one of these days. I hope so. Come on Dave lets see something!

Past Shows

Ham-Com 1987

I am not sure how this review got left out of last months issue but somehow it did.

This years **Ham-Com** was the best one we have attended. In fact, it was so good for us that we did better there, I think, than we did in Dayton this year and Dayton this year was the best one yet for us. How about that!

Teenie and I drove out with our trailer of course. Christie didn't get to go because of school. She has started working on her master degree in education. I had attempted to make reservations at the campground we stayed last year but according to the phone company computer it was out of business. So, I made reservations at the other one the Ham-Com brochure recommended. Upon

Tell them where you saw it!

arriving in the Dallas/Ft Worth area and montoring the talk-in frequency, we heard other RVers asking about the campground. As it turned out, the area code for the campground we wanted to stay in was in error, thus, the disconnected phone number.

We drove to the campground, got one of the very last of 4 spaces I think. Set up and went on to the hamfest site at the Arlington Convention Center and got all set-up.

Saturday was a big day - many many people. Teenie and I were very busy.

John Fleet and his gang really put on a *good* show this year.

Any of you companies needing to attend a good show, should check into this one. It is getting better each year. One thing that causes this, in my opinion, is that John Fleet is in charge each year. I firmly feel the shows that are worth going to are the one in which the chairperson is the same *each year!*. Such as Miami, Dayton, Charlotte, Dallas/Ft Worth etc. . . Since most hamfest are done on a volunteer basis the chairperson is normally new each year, lacking experience in running a hamfest. That lack of experience is very evident at most hamfests.

Ham-Com is one hamfest that Teenie and I will be looking forward to each year.

I just got information from John that the **1989 ARRL Convention** will be held at **HAM-COM.** This will be the Diamond Jubilee (75th Annual) National Convention. Now with that bit of information, you companies that haven't been there before should not only plan on attending the **1989 Convention** but you should contact John now, for the **1988 HAM-COM.** You won't be disappointed. You can bank on it!

John you can sign us up for the next two years, **NOW!**

John you and your committee did good!

Atlanta HamFest 1987

Remember earlier is this months "Chat's" I told you I make people unhappy with my comments on hamfest and it use to include computer shows.

Atlanta is no exception. I had many club members get me off to one side telling me they didn't like my comments on what I was expecting from this years hamfest.

I am **glad to say,** I was basically wrong. It was much better this year than last year, but there is still much room for improvements. And, it appears that the interest is there to improve it. I talked to Jim Farmer, N4IBW club president and Bill Schmidt, KF4CQ, This years hamfest chairman, who told me how they were planning on correcting some of the problem areas. There isn't any reason to expound on them here.

They were upset and rightly so that our cover issue for the hamfest got out late. But, some of the fault was theirs but mostly mine.

Hamfest Thief Caught and Jailed

Those are sweet words to most of us, including dealers and hamfest committees throughout the country. I won't go into details how he was caught so I won't let others know how to do a better job. I will say that the Georgia ham from near Atlanta shouldn't be seeing freedom for sometime.

He stole a radio from HRO and got another from R & L Electronics.

More and more hamfest now have patrolling uniformed security and have doubled and trippled their plainclothes security people including female. So it won't be so easy to get away with equipment. And, that is good.

Just a thought, if you should see a theft take place, don't take any action yourself other than seeking out proper security and notifying the dealer involved. You never know who is carrying what and it could be dangerous.

Back to the hamfest. . .

I am glad I was mostly wrong with my expectations. I talked to many dealers and attendees, several of them had various things to say about the show. Most of them don't like the Georgia World Congress Center for the hamfest site. Primarily because of the parking situation and having to walk so far after finding a parking place. Many if not all wanted to return to the civic center where it used to be. But, that according to Bill is now a museum.

Saturday night banquet

Normally, Teenie and I don't go to hamfest banquets but as we were leaving the hall Saturday one of the club members gave us a couple of banquet tickets. Naturally, Teenie and I went. The meal was much better than most convention banquets. They didn't even have frozen green beans, can you believe that!

The food was good and we had a very nice couple from North or South Carolina sitting with us and I have lost my piece of paper I wrote their names on. Sorry bout that. . .

The entertaining was much better than most but the highlight of the banquest was when Mike Lamb, N7ML President of AEA presented **The Amateur of the Year** award to Byron Lindsey, W4BIW of Decatur, Georgia. I was hoping to have the full details of the award and photo but Mike didn't get them to me in time for this issue. I hope to have them for next month.

One of the nicest things about the award was the $1,000. check that went along with the award.

Congratulations Byron!

Coming Events

Jacksonville (FL) Hamfest

By the time or before you read this, Teenie and I will be at the Jacksonville Hamfest. It is being held at a new or renewed convention center and it is my hope that this move will make it a better hamfest. It hasn't been that good, for us, the past two years. It is a nice hamfest for locals but very difficult for dealers to travel great distances for such a small show.

I do think the change to the new location and the emphasis the City of Jacksonville is putting on getting conventions to Jacksonville will make a great difference.

I'll let you know next month.

Continued on page 13

A Guest Editorial by Robert S. Hoover, KA6HZF

Baldwin

OPINION

(The following is a personal opinion of the author and does not necessarily represent the opinion of Lambert Publishing House nor **CTM** magazine. Qualified persons with an opposing point of view are invited to submit a reply.)

BALDWIN

In the July 1987 ***QST,*** Mr. Richard L. Baldwin, President of the International Amateur Radio Union (IARU) bemoans the fact there are barely a thousand hams in all of Africa "... (excluding South Africa)".

To solve this "... distressing situation..." Mr. Baldwin proposes using IARU funds to round up used, donated, "...transceivers..." from American and European hams, and ship them off to Africa.

Obviously, Mr. Baldwin is a few cans shy of a six-pak. If the premise -- equipment begats hams -- had any virture, the proof would be 3 million or so American Amateur Radio operators instead of the scant, aging 400,000+ we presently have.

Then why make such an asinine and obviously flawed proposal?

Also missing from Mr. Baldwin's astounding proposal are the means of *distributing* those transceivers he wants **you and I** to donate. Who gets what, Dick? More importantly, exactly who *decides* who gets what? (And why only "...transceivers"? Home-brewed gear like mine not good enough?)

Mr. Baldwin points out that a $1,000 transceiver is "...too rich for many... Africians..." (And many Americans too, Dick.) But too 'rich' *indeed* for a continent where the average annual income is something under $50 (again, excluding South Africa).

Always ready with a quick and easy solution, Mr. Baldwin proposes a "simplified" transceiver costing "...something less than $200". Now *that's* a good idea, and not just for African hams. The only problem with this quick and easy solution is the simple fact "...something less than $200..." is an *ultra-luxury item* in most African nations.

Let me put that in perspective. The average annual income in the United States is about $15,000. Could you become a ham if a radio cost $300,000 -- and you didn't know how to build one? Mr. Baldwin's "...simplified transceiver ..." would reduce that cost to *only $60,000* -- dirt cheap from Mr. Baldwin's point of view.

Are the economic facts of life too complex for Mr. Baldwin to comprehend? Can the President of the IARU **really** be so out of touch with reality? Or is there another reason for Baldwin's absurd proposal?

Consider this: Baldwin goes ahead with his little scheme and distributes a few hundred "transceivers" to African countries. This will surely produce a few hams -- the matter seems fore-ordained. But these will be hams who quickly go on the air and fade away with equal speed, for without a supporting foundation of technology their days are surely numbered.

But during their brief moment of glory, who will these instant hams communicate with? Surely not *only* with other Africians -- Mr. Baldwin has already told us there are barely a thousand in all of Africa (excluding South Africa, of course). My guess? Baldwin's Honor Roll cronies will make up 90% of the traffic, green stamps and all. Which appears to be the whole idea.

Richard Baldwin is a so-called Elder Statesman of Amateur Radio and past General Manager of the American Radio Relay League (ARRL). His performance as President of the IARU, like his role in ARRL, has been lackluster at best, apparently more concerned with supporting the Honor Roll gang instead of promoting truly international accords. But whatever the reason, the record clearly shows Mr. Baldwin has lost the confidence of the African delegates. Is he attempting to *buy* their votes with a pile of old radios? If so, I think Dick Baldwin is about to discover the days of trading trinkets for African gold have long since passed.

Electronic communications are vital to every modern nation, a keystone in their survival. Amateur radio, in the modern-day, is but an *artifact* of communications technology, a healthy sign of technology well-mastered. As emerging African nations develop their own communications and their supporting technology, the number of African hams will surely grow, but initially it is impossible for a young nation to develop both simultaneously. A young nation must be a *selfish* nation if it is to survive; Amateur Radio is good, but only so long as it supports and sustains the National interests which foster it -- another fact which seems to have escaped Mr. Baldwin and his cronies.

If Mr. Baldwin is sincere in his desire to resolve the situation he

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now finds so distressing, you would expect to see him directing greater effort toward helping the African delegates solve the basic problem -- the development of modern communications in their countries. Instead we find him foisting them off with a Missionary Box of old (but *clean!*) "...transceivers".

It would be well for IARU delegates from African nations to know the *majority* of American Amateur Radio operators are *not* members of the ARRL and have voted with their pocketbooks to *not* support that organization. Why? Probably for the same reasons African delegates to the IARU refuse to support Mr. Baldwin.

All people hunger for a better life, a hunger often satisfied from the granaries of technology. But they hunger too, to reap what *they* have sown, to enjoy not imported grain but the bounty of their *own* fields. As president of the IARU Mr. Baldwin has had ample opportunity to hear these hungry voices at first hand, to come to know the hopes and aspirations of the African nations. And in his role as President of the IARU he has considered these things carefully, to the best of his ability. Now he has stepped down from on high to deliver his proposal: A quick trip to McDonalds for a Big Mac and fries.

I think it's time for Dick Baldwin to tuck his transceivers under his arm and step down all together.

Robert S. Hoover, KA6HZF
1875 Monte Vista Drive
Vista, California 92084 **CTM**

Continued from page 11

Huntsville (AL) Hamfest

Most of you know how much Teenie and I look forward to this hamfest. It is one of the best ham-fest in the country and it wouldn't surprise me to learn that they will host a *national convention* one of these coming years. They work hard toward their hamfest all year long and the hard work is evident with the results each year. You can tell it isn't all done in the last 3 - 4 months prior to the hamfest.

It's a great show and Teenie and I will be there. **CTM**

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By J.C. Smith Jr.

Apple Core

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Now let's get to this months program. It's called "GOLD MINE".

Type this program in and follow the instructions. I really did enjoy playing this game. I'm sure you will to.

Goldmine

```
0  TEXT : HOME
1 C = 1000000
2 B = 331.6
3 M$ = "DAVY"
4 R$ = "SEPT. 20. 1979"
10  VTAB 10
20  HTAB 10
30  PRINT "G O L D   M I N E"
35  HTAB 10
40  PRINT "- - - -   - - - -"
42  PRINT
45  HTAB 10
50  PRINT "BY ROYCE A. JONES"
55  FOR I = 1 TO 1000: NEXT I
60  DIM X(20,30)
70  HOME
75  VTAB 11
80  PRINT "I'VE BEEN A MINER FOR
    A HEART OF GOLD."
85  PRINT "AND I'M GETTIN' OLD."

90  PRINT : PRINT "---NEIL YOUNG
    ---"
95  FOR I = 1 TO 2500: NEXT I
100  HOME : VTAB 12
105  INPUT "DO YOU NEED INSTRUCT
    IONS? ";K$
110  IF  LEFT$ (K$,1) = "N" THEN
    400
120  HOME : VTAB 7
130  PRINT "   THROUGHOUT MANKIN
    D'S HISTORY GOLD"
140  PRINT "HAS BEEN A MAGIC MET
    AL.  GOLD HAS BEEN"
150  PRINT "PRIZED BY NEARLY EVE
    RY CIVILIZATION."
```

Continue on page 85

Tell them where you saw it!

By Buck Rogers, K4ABT

Converse Transparent

(tuning meter for HF Packet & RTTY)

In the April, 1987 issue of **CTM** (page 91) I did a review of the Kantronics All Mode Communicator (KAM™). One of the nicest features of this fine product is the Bar LED tuning indicator. This is the easiest of all the tuning devices I've used to date, for tuning PACKET, RTTY, CW, AMTOR, and ASCII.

This started me to thinking about all of the Packeteers who were using the many packet controllers that are not equipped with any kind of tuning indicator. A tuning device for HF Packet is a must. I have tried to tune HF packet without a tuning indicator, and it would tax my patience to no end. If you really want to test your nerves, then try a transceiver with an analog tuning dial.

I recently purchased an ICOM IC-735 HF transceiver and now my life has taken a wonderful turn for the better... in all facets of amateur radio... hi hi (If you read the above mentioned review, you will note; at that time I was using an old relay clunking 101, analog dial tranceiver.)

TO THE MEAT OF THE MELON and this months goodie. I picked up an idea from a local friend who had recently purchased a Kantronics KPC-2™ He asked

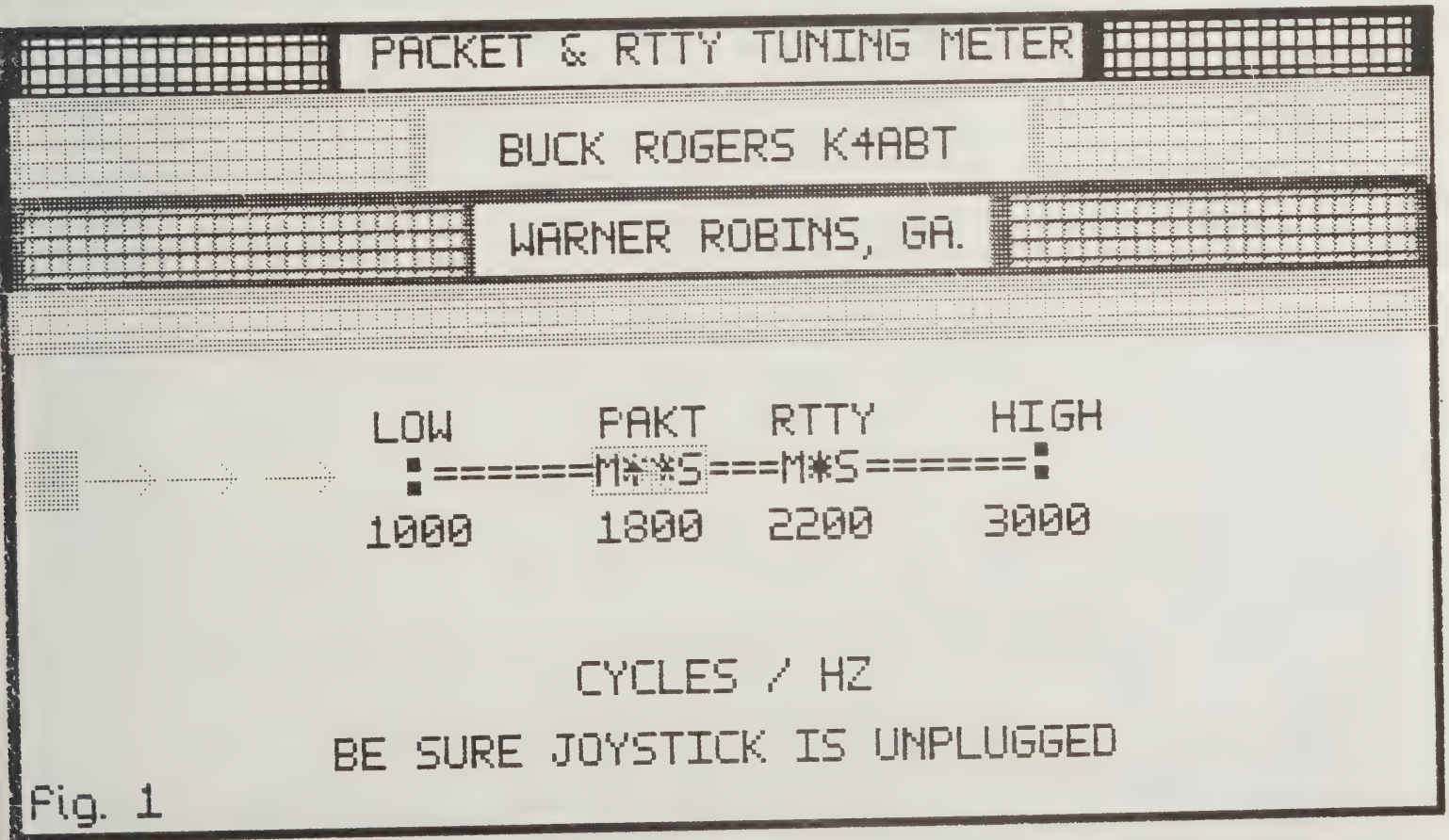

Fig. 1

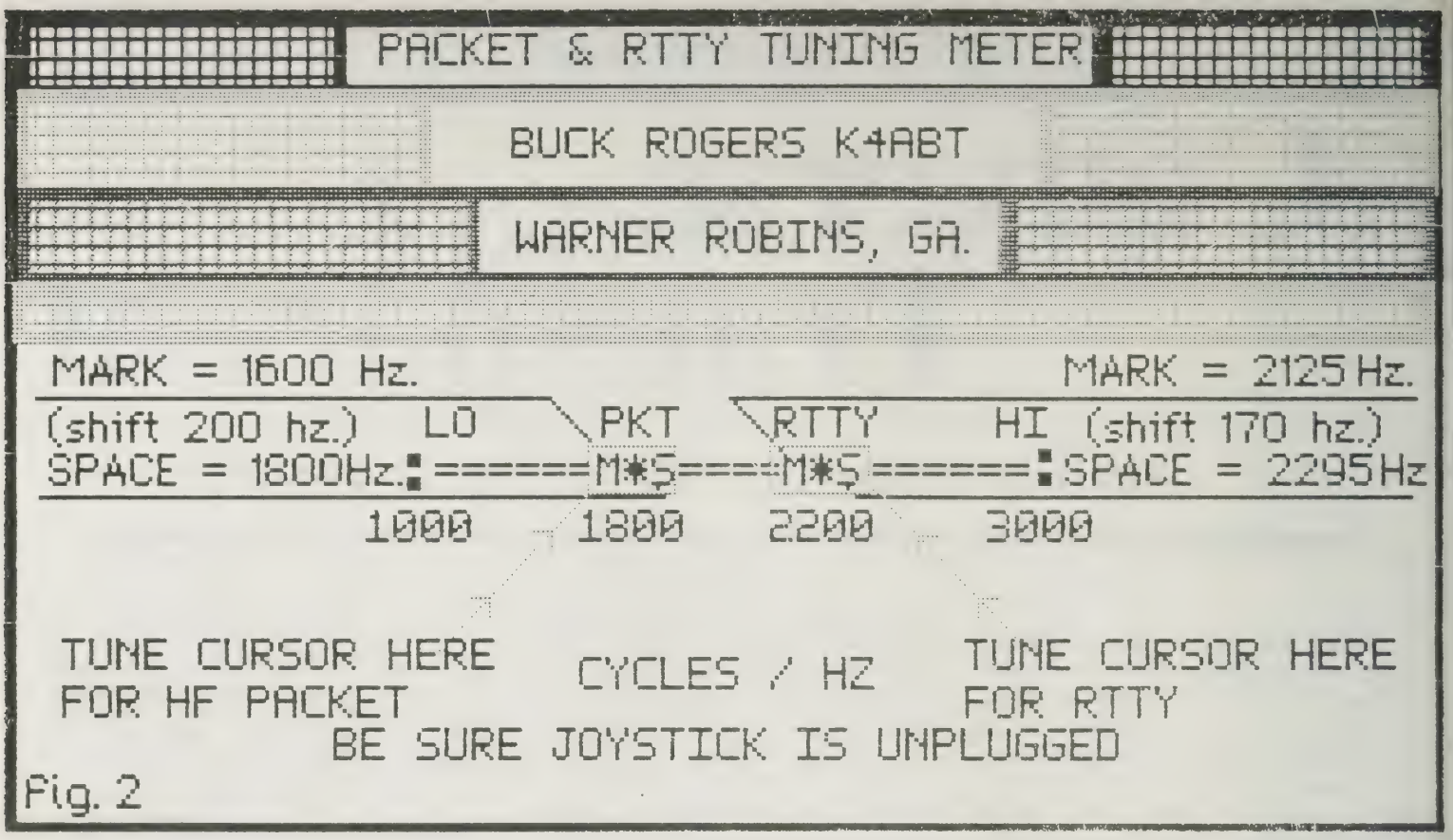

Fig. 2

me if I could help him use his TRS-80 COCO® and KPC-2 on HF PACKET. I told him all he had to do was to go the the command mode and set these three settings "on" and he would be in business.

CMD:HF ON

CMD:HFTones ON

C:CCitt ON

I also gave him a brief lesson on where and how to tune HF Packet. He later called me to affirm (@#$&%* censored) that he was still having trouble tuning in HF 300 Baud Packet with his Drake transceiver.

The BASIC program contained in this installment of Converse & Transparent are the fruits of my labor and the way I helped a friend solve his problem. I would like to share it with others who may have the same problem. This may be just your ticket to HF packet.

Getting Started

The simple part of the setup is the ease of inputing the audio into the COCO. Use the Cassette (black plug) interface cable, audio input. The cable is available from Radio Shack for $5.95 and is part number 26-1207. It may be to your advantage to have a 3.5 mm male to dual 3.5 mm female audio splitter, so that the audio can be fed to the Packet Controller and the cassette cable at the same time.

Type in the program and debugg it, or if you wish, I will provide the program on disk, ready to run for $5.00 to cover disk, postage, and handling.

Next, make the audio connection(s) and be sure the *joystick is NOT plugged into the COCO.* Load and RUN "HFTUNMTR.BAS". Set the audio level at a low comfortable level and tune to 14.103 (MHz.) LSB. Tune around this frequency ±1 KC and note the movement of the black cursor... there should be one bouncing around.

When you hear the HF packets they will sound like fast RTTY, coming in 2 to 5 second bursts. This is where you tune the dial as slow as possible while trying to place the cursor over the M and the S on the line beneath the letters "PAKT" (fig. 1). If you are tuning RTTY, the same method applies, except use the M & S beneath the letters RTTY (fig. 2).

Once you have the cursor corresponding to the packet bursts and in place over the Mark and Space boxes, leave the receiver dial alone... don't even think about touching it. Now load your favorite terminal program and make the correct settings to your packet controller for HF packet operation. (If you are using Kantronics, use the settings listed above.) You should see packets print across your screen. If you don't hit pay dirt the first time, practice the procedure a few times until you have the feel for this new world of HF packet which is about to open to you.

If you are fortunate to have two COCOs or even one COCO and another terminal, you can use the COCO on line all the time and actually tune around the other 20 meter packet frequencies without concern for the dial setting. The other terminal will be connected to the TNC.

There is a small amount of activity on 40 meters around 7.093 MHz. The largest packet pop-

Tell them where you saw it!

ulation on HF is on 14.103, 14.105, 14.107, 14.109 and lately on 14.111 MHz. 14.103 and 14.105 are QSO, two party for the most part and 14.107 is mostly packet BBSes. 14.109 is by and large a BBS to BBS forwarding frequency. Unlike VHF, HF packet seems to have some organization to it.

Now a word to the wise, set TXD as short as possible ie,. KPC-2 and IC-735 works well with a TXD 3, AXD 1, AXH1, and RESP 5. Keep packets as short as possible. If you are prone to send long packets set PACLEN to 50 and MAXFram to 2.

73 es goodluck, C U on HF packet.
DE BucK4ABT
CMD: *** DISCONNECTED (UA)
IC-735 is a product of ICOM inc.
KPC is ™ of Kantronics Inc.
TRS-80 COCO is a Trademark of Tandy/ Radio Shack Corp.

Buck Rogers K4ABT
506 Pheasant Ridge Drive
Warner Robins, Georgia 31088 **CTM**

```
0 REM THIS PROGRAM IS PUBLIC DOM
AIN
10 REM BUCK ROGERS  K4ABT
20 CLS
30 PRINT
40 PRINT"PLEASE WAIT..."
50 AD=&H600:LI=900
60 READA$,CS
70 IF A$="X" THEN 150
80 FOR I=1 TO 64 STEP 2
90 A=VAL("&H"+MID$(A$,I,2))
100 POKE AD,A:CS=CS-A:AD=AD+1
110 NEXT
120 IF CS THEN PRINT"DATA ERROR
IN LINE";LI:END
130 PRINT@462,944-LI
140 LI=LI+1:GOTO 60
150 A=INT(F1/256):POKE&H600,A:PO
KE&H601,F1-256*A
160 PRINT@0,STRING$(3,179)"PACKE
T & RTTY TUNING METER";:PRINT@29
,STRING$(3,179)
170 PRINT@32,STRING$(32,169):PRI
NT@64,STRING$(6,159);:PRINT@70,"
  BUCK ROGERS K4ABT";:PRINT@90,S
TRING$(6,159):PRINT@96,STRING$(3
2,169)
180 PRINT@128,STRING$(8,188);:PR
INT@136,"WARNER ROBINS, GA";:PRI
NT@153,STRING$(7,188):PRINT@160,
STRING$(32,179)
190 PRINT@192,STRING$(32,188)
200 A$=CHR$(PEEK(&HC000))+CHR$(P
EEK(&HC001))
210 IF A$<>"DK" THEN PRINT:PRINT
:GOTO230
220 PRINT
230 PRINT"       LOW    PAKT RTTY
 HIGH"
240 PRINT"         :====M**S=M*S==
==:"
250 PRINT"      1000    1800 2200
 2600"
260 PRINT
270 PRINT"             CYCLES / HZ"
280 PRINT" BE SURE JOYSTICK IS U
NPLUGGED"
290 EXEC CS
900 DATA0285050A004D00E703820704
00330099040008000026007 20F718634
B7FF030F,1740
901 DATA660F671700E3260EB7FFDEBE
C0066F846F01AD9FC004B7FFDF7FFF40
7F09861C,3846
902 DATACE03D78E0400A6848A40A780
8C060025F51703338D0220DE8D57080B
0002840D,2661
903 DATA1000028212160002810 41B22
048F021C440332090E66001 1090E7700
1D090E88,1154
904 DATA001C8080000078 8D28139568
03D61A9C6803D5808000006786022002
86039761,2490
905 DATA8D0F131568034B1A1C68034A
8080000004E17027235109F628D2ADD64
8D773410,2244
906 DATA1700908D1F10936427073510
17008420E71700EE8D4D27EBAEE43003
EC84AD8B,3021
907 DATA3510206F8D18FC015A445454
8D1B2607C1082302C60839C10423FBC6
0439B7FF,2850
908 DATADEAD9FA00AB7FFDF39B7FFDE
BEC000B7FFDF8C444B39B6FF00840139
8DF827FC,4792
909 DATA9766398DF19166270B8E222E
301F26FC8DE49766399E628D6B916422
04D16424,3391
910 DATA073005E6842AF0398D619165
22F3D16525EF39CE04008D536D012A04
96651F89,3174
911 DATA3402E0E45CE7E4C6203D33CB
8D366D012A0496641F893406E6842A10
33C6E6C4,3524
912 DATAA68D001FA7C4E78D00192014
E6C6C840E7C64CA16123F533C820A6E4
6A6226EC,4040
913 DATA326339CFEC84841FC41F39A6
024444444E602C40F39B6FF205A2705
B1FF2027,3274
914 DATAF839C6208DF02708C6408DEA
27028DE654D16727158E05409667D767
E686CA40,3880
915 DATAE7869667E686C4BFE7863986
34B7FF03863CB7FF0186D6B7FF208680
B4FF0027,4605
916 DATA053DAC842008DC52DD56DC50
```

```
DD54862AB7FF208680B4FF0027043D12
200ACC26,3373
917 DATA02DD56CC0E00DD548634B7FF
019E4086D6B7FF208680B4FF0027038E
0001862A,3555
918 DATAB7FF208680B4FF0026029E42
301F26FCA69439DF483A3386DF4C8601
A7844F5F,3616
919 DATADD4AB6FF205CC1262504A101
2005B1FF2027F2D74E1DA18BD34ADD4A
9348251B,3557
920 DATADD4AD64EF7FF02D14F698424
0430012005CC0001E70112C606200F86
01B4FF00,3018
921 DATA260617FE7716FD8EC6049C4C
25B4DC48934A2F07A18B830001126F917
FF2D399E,3332
922 DATA52DE448660208C5F9E50DE46
86202083 8DF55F8DEA8DF0C6608DE48D
EAC6C020,4425
923 DATADE5F2006C6082002C610308D
FD123ACE0040860 8E680E7C04A26F98D
49861197,3397
924 DATA4F8E26029F52CE0E00DF5033
C820DF54308901209F568DB8DE54DF50
9E569F52,3497
925 DATA8CFE0225E6397FFF22CEFFC6
A75AA75CA75E860444C607442406334 1
A7C02002,3602
926 DATAA7C15A26F23986F0B7FF22CE
FFC6A75AA75DA75F860E20DC8690F601
5BC13F26,4381
927 DATA015C3D58495849 8E26023 08B
B6015A813F26014C30862038000000C00
00000000,1695
928 DATA0000000000000008DBD8DCDFC
015A340617FD6BFC015A10A3E127028D
BB17FD83,2983
929 DATA27E9398DA18E260263808CFE
0225F939108E0E00C620A680A7A05A26
F9308840,3427
930 DATA108C260025EE39108E0E00C6
20A6A0A7805A26F9308840108C260025
EE392602,2740
931 DATA26222642 6E026E226E42B602
B622B642C6002002C611D760D661C103
26028D24,2738
932 DATA17FF43318CD88609AEA13422
9661810326068D9C8D762 0048D728DAB
0C603522,3091
933 DATA4A26E539B7FFDEFEC006CC02
00EDC4CC1102ED428E0E00AF44AD9FC0
04B7FFDF,4263
934 DATAD660260FC600A6854C1026FB
E95CC11723F439C62BA6854C1026FBDA
5CC14323,3644
935 DATAF439C6ED2002C6F7340417FE
D9D665C00686033DDB64EBE0D7608602
97618D0C,4102
936 DATA7FFF407F098617FC8D26FB39
3476B7FFDEBEC006D661E7846F01CC0E
00ED04CE,4147
937 DATAFFFF9660C6183D1083013325
03C3000233418300 1224F9C30013E703
1F30E702,2785
938 DATA108E0018AD9FC0048D1F6C04
EC0210831101260 2CB025CC112230 3C6
014CED02,2497
939 DATA313F26E0B7FFDF35F617FC2A
260C7FFF407F098617FC2516FB3C3917
FE48B6FF,3905
940 DATA228401263886FE976F8E2602
861B8D2386338D1F86178D1B8D24861B
8D158633,2797
941 DATA8D1186018D0D8D1630890540
8CFE0225DB860DB7FFDEAD9FA002B7FF
DF398DA9,3845
942 DATA860D8DEF861B8DEB864C8DE7
86008DE386038DDF8660341286 01975F
A684108E,3786
943 DATA0058C6084969A05A26FA3089
00C024EC8E0058C608A680438DB95A26
F8351230,3277
944 DATA014A26D2390000000000000000
0000000000000000000000000000000000
00000000,380
945 DATAX,1560
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Tell them where you saw it!

By Jamie Lucas, KB4MUM

Alabama's First 220 MHz Digipeater For Novices

Remember in March, March 21st to be exact, when the novice enhancement went into effect, ICOM of America, AEA, and Certified Communications (The Wireman) donated equipment for the first novice digi installation in the country, I think. Buck Rogers, K4ABT had the idea and we got together and got things rolling.

As it turned out, the novices down in the Warner Robins, Georgia area upgraded and the equipment became surplus.

Buck Returned the equipment to me and I got with Jamie Lucas, KB4MUM who has it up and running as a novice digi here in the Birmingham area.

As Jamie puts it:

The first 220 MHz digi is up and running for all novices to work into on 223.600 MHz. At the present time we are running extremely low power, only 5 watts but it is enough for the novices to work into the 224.940 MHz voice repeater in Leeds, Alabama which is approximately 30-40 air miles. We are hoping to put on an amplifier in the near future in hopes of increasing our range into other 2 meter digi around the state.

Additional plans are to link this digi with 145.670 local LAN so the novices can link into the BBS as well, to really give them a tase of what ham radio is all about. If other plans go as we hope, we may even have a telephone BBS for them to experience.

Novices will be able to collect maps, weather information, packet and digi information.

We are currently running with a Commodore 64 and have limited disk storage, but we are hoping that will change soon.

Thanks to Chet Lambert, W4WDR for the loan of the equipment and John Murphy, KA4ZXL for the use of his call sign for connecting with other digis. If you are in our area and would like to connect to us, we are KA4ZXL-7. To connect with the BBS call (205) 786-0010 between the hours 900 pm - 1200pm (0200-0500 Zulu at 300 baud PUNTER PROTOCOL) Hopefully we will have XMODEM protocol.

If anyone has information and suggestions on how to improve our digi please contact me. We need all the help we can get. We are especially looking information on how to use the AEA PK-87 and to control 2 radios or how to link 2 radios. We are also looking for information on how to do the same thing with the MFJ 1270 or 1270B.

Jamie Lucas, KB4MUM & KA4ZXL-7
3316 Pike Ave. Minor
Birmingham, AL 35224 CTM

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Tell them where you saw it!

By Robert S. Hoover, KA6HZF

Cover Story

Captain Kirk's Lunch Box

A Totally Self-Contained, Solar Powered, Portable PACKET Digipeater for Emergency Communications, by Golly!

My grandfather was in San Francisco on the 18th of April, 1906 -- one of thousands who experienced the Great Earthquake at first-hand. But to the confusion of us kids, he always referred to it as the ***Great Fire.*** It wasn`t until I became involved with Disaster Management that I learned how right he was; the earthquake was over in an instant, the fire which followed raged for days and did *twenty times* the damage.

Wild Fires -- brush or forest fires -- can be just as deadly and even more difficult to fight. Here in California we`re given annual reminders of how powerless we are against our oldest enemy. No one has solved the problem of wildfires -- they`re a hazard to every part of America and to every nation as well. Earlier this year a forest fire burned more than a million acres in China, killing over 200 people; entire towns were reduced to ash. Can`t happen here? It already has -- most of you probably don`t remember the Tillamook burn back in the1930`s but you should recall the Sweetwater fire -- 258,000 acres.

Fighting a wildfire is like a military operation. You can`t always pick your ground to fight on and you may need a different strategy for every fire. In this fluid, constantly changing battle, dependable communications are absolutely vital.

Wildfires have another interesting habit; they seem to pick the deepest canyons and the roughest terrain; country that soaks up radio signals like a sponge. To insure you`ll have solid communications you`re often forced to use an aircraft as an orbiting radio-relay station and when the plane isn`t there...

The Need For Digital Communications

One of the most critical problems in dealing with wild fires is people. During times of war we *depend* upon Reservists and draftees to fill out our ranks; it`s much the same when fighting fires. We can`t afford to maintain a stand-

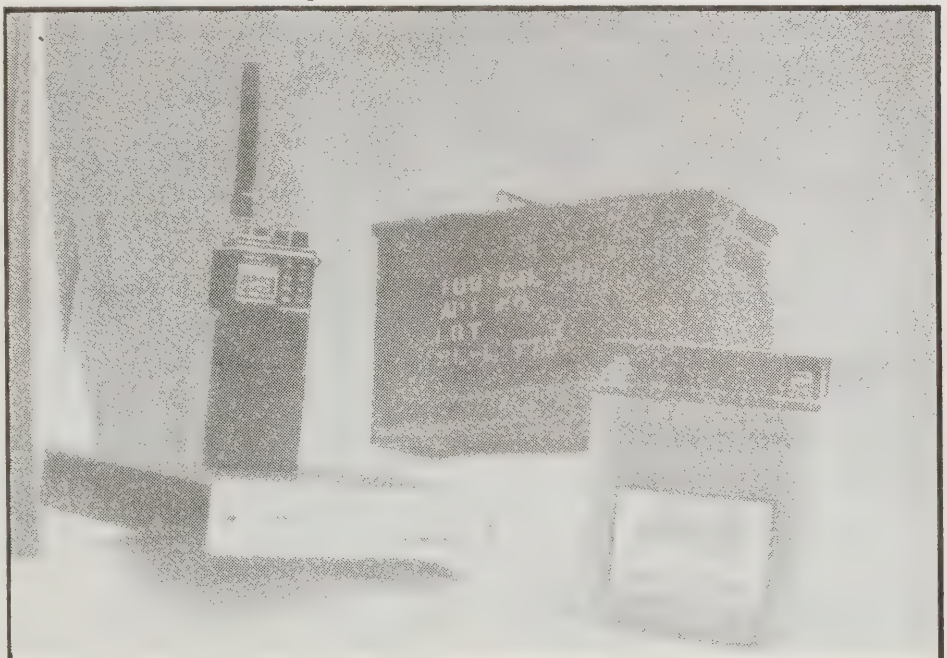

Photo 1. Make it Fit! Basic components for a man-portable digipeater: MFJ-1270, Yaesu FT-23R, motocycle battery, ammo can (antenna not shown).

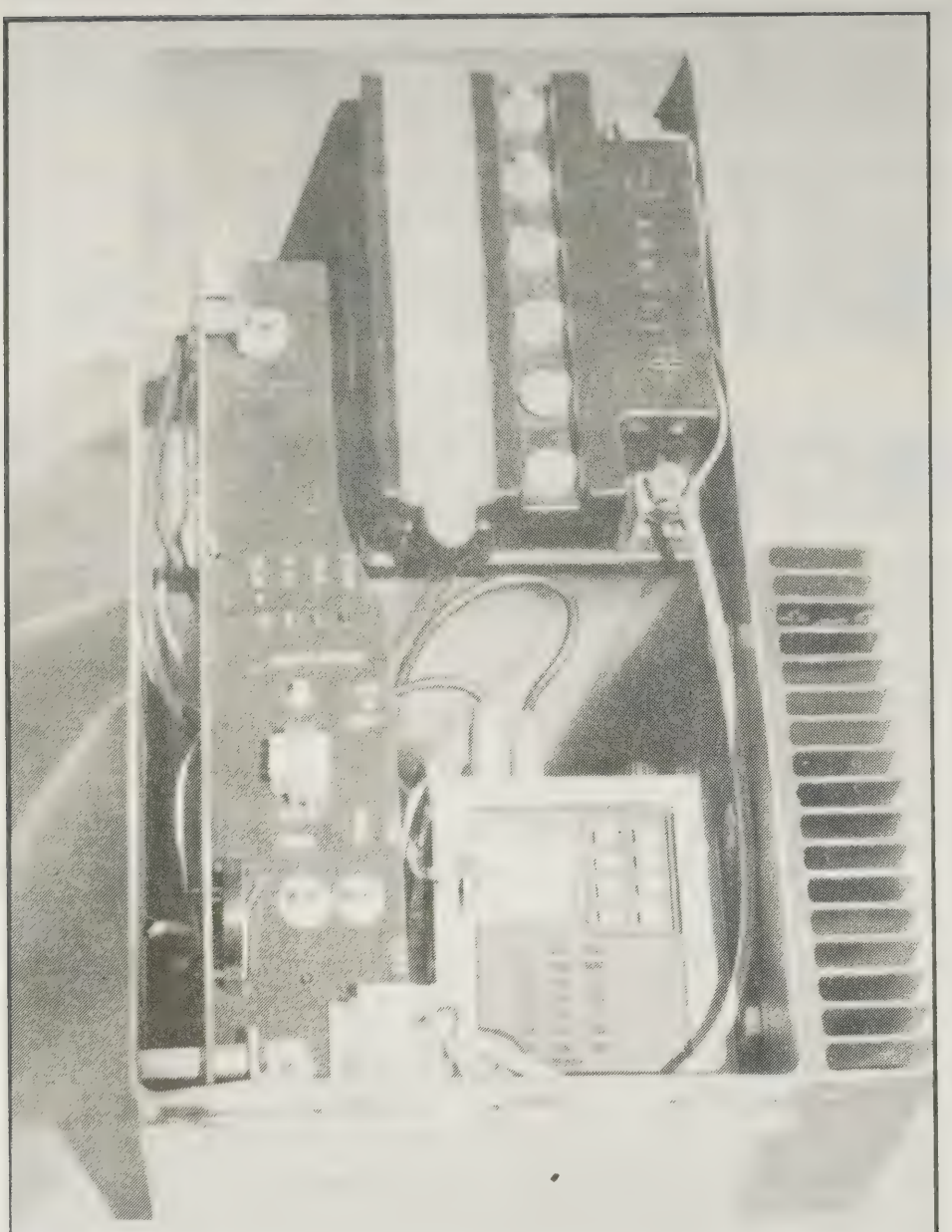

Photo 2. Just about done. Auxiliary power wiring and head-set jack still to come.

ing army of skilled fire fighters year `round, we depend upon part-time help during the fire season. These people come from many walks of life -- students, military recruits, local residents -- even prisoners, if they`re willing to volunteer. They risk their lives for a laughably small wage when they receive any pay at all.

Firefighting is a 24-hour a day job, the people on the line must depend on others for a variety of support and that includes personal communications. This kind of message traffic isn`t essential to the tactics of fire-fighting but to ignore it is to quickly find yourself without enough volunteers to battle the blaze. Fire fighting is a *skill* -- if we ignore the needs of our skilled volunteers we`ll lose them, and lose the fight as well.

In Support of FINDER

A big wildfire may involve up to 10,000 firefighters at dozens of temporary camps, scattered across a thousand square miles. These people require support in the form of food, special clothing and shelter, to say nothing of their own personal need for communications. Some of them have been called out at a moments notice and after a time on the fire line they begin to generate message traffic: The spare car keys are in my desk at work... Re-schedule my dental appointment ... Call the school and tell them where I am...

And of course, it works both ways. Often times an urgent call goes out summoning a fire-fighter from a camp in the wilderness, in response to some family emergency or other critical need. In some cases the message follows the person from camp to camp as people are shifted to combat the blaze. All too often delivery is never made, or made only after a prolonged delay,

Providing *unofficial* communications support in the form of Health & Welfare traffic-handling was the initial role for Packet Radio at fire camps. Packet worked so well its use is now a key element in a formalized, well structured system called FINDER. (I`ll tell you more about it later.)

The speed, dependability and error-free nature of Packet impressed the fire marshalls enough to trust it with some tactical communications as well; the thermal barrier thrown up by a fire often disrupts the UHF system used in much of California. But given a solid one-hit link between the fire camp and headquarters, 1200 bps Packet Radio has no trouble handling both tactical and support communications -- and can provide a printed output as well.

But there are many problems using VHF Packet at forward-area fire camps. You`re liable to find all direct communication paths blocked by terrain. The solution lies in the use of portable digipeaters to complete the link to the base camp. (HF Packet has been used, with mixed results -- VHF and UHF show more promise... and greater speed.)

Lunch Box Specs

Following the fire season of 1985/86, I discussed the use of Packet Radio with various California Division of Forestry (CDF) fire fighters and came away with specifications for an "ideal" portable digipeater. On the surface, the

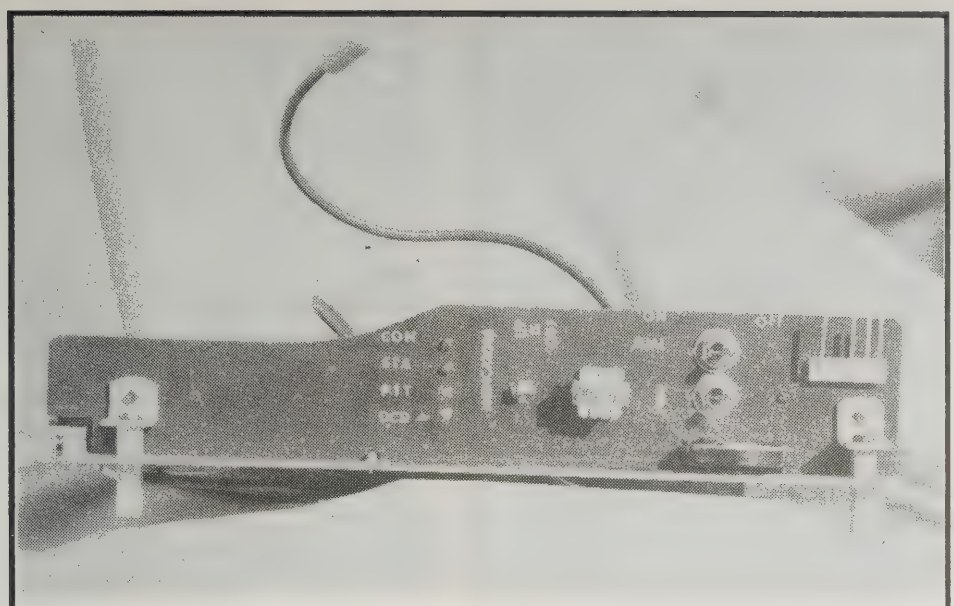

Photo 3. Control panel facilitates non-emergency use; indicator LEDs may be turned off to conserve power.

specs didn`t appear too formidable. It had to be manportable. It had to be tough enough to withstand being knocked about. It had to have a fairly powerful signal; ideally, it should operate between 140 and 150 Mhz. And it should be able to operate for *at least* ten days completely unattended; longer if possible, allowing us to preposition some equipment *before* the fire season.

Down on the bottom of the list, over in the cost column, was a big, fat zero -- CDF didn`t have funds to develop such a system. Initially, portable digis would have to come from the Amateur Radio community, at least until the technique -- and the equipment -- had proven itself.

Worst of all, perhaps, is the fact we need a *lot* of them. California is a big state with lots of forest and brush land. During the fire season there may be two dozen fires burning at once. Proper coverage and rapid response calls for portable digis distributed throughout the state, and we needed them **now**, in time for the next fire season That meant the system would have to be assembled from off-the-shelf components.

Designing a Portable Digipeater

Having already designed and built a portable repeater, I tackled the digipeater task thinking I`d have it solved in a couple of days. Wrong. My portable repeater was intended to be transported by *helicopter*; it was a squat, three-legged affair that looked like a miniture Lunar Lander, except for the thick antenna mast -- which also served as the grab-hook point to let it be carried by a chopper. And it was too heavy.

So I started from scratch. My first step was to find a sturdy chassis, something *cheap*, but tough enough to stand being knocked about in the back of a fire truck. I finally chose a .50 caliber ammo can. They are readily available, the steel construction insures adequate protection, and they`re airtight when properly latched. Best of all, they only cost a couple of bucks.

All I had to do was stuff a Packet controller, a transceiver, and a battery into the ammo can. Ummmm... The other problem, as always, was money.

I don`t want you crying in your beer but the next six months were rough -- and sometimes funny, too. With but a single TNC to work with, yet wanting to keep certain schedules on Packet, I soon became expert at tearing down the Kaypro, where the TNC was mounted *beneath* the motherboard, and stuffing it into the ammo can for further tests or modifications. The TNC was already modified for use in the Kaypro so each shift to the ammo can called for *additional*

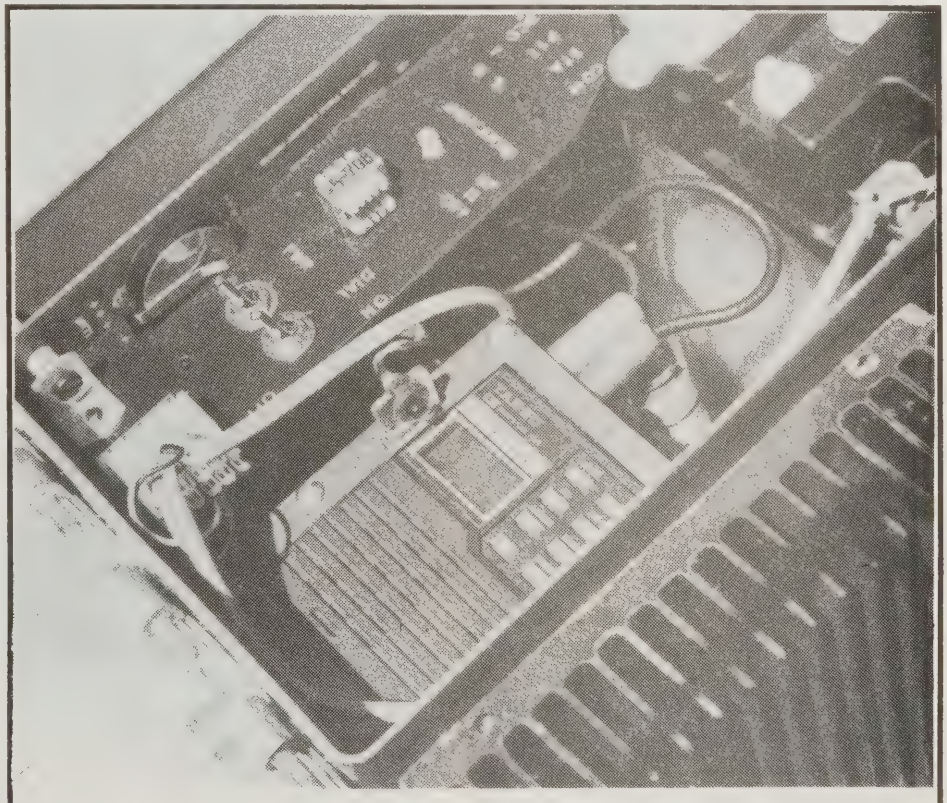

Photo 4. Plenty of room! MFJ-1270 is mounted on edge, Yaesu FT-23R clamped to heat-sink/shelf. Note dial lamp.

Photo 5. Getting rid of the heat called for a special paint job and use of a finned heat sink.

mods to re-configure it for the Lunch Box project.

Besides the TNC problems, it turned out I didn`t have a suitable radio. (I`m the only ham I know who doesn`t own an HT.) Have you ever tried to stuff an Azden PCS-4000 into an ammo can... along with a TNC and a battery big enough to keep them running for ten days? (Fat chance. But I sure *tried!*!)

Good things started to happen when I mentioned the problems to Chet Lambert, publisher of **CTM**. He put me in touch with Mr. Chip Margelli, Marketing VP for Yaesu Radio; in a week an FT-23R was sitting on the workbench, courtesy of Yaesu. The same week I got a call from Mr. Eddie Richie of MFJ; Chet had spoken with him and he was calling to let me know they were sending another MFJ-1270 to be used in the portable digipeater project. Hog Heaven! Now if I could scrape up the money for a battery...

With all the parts on hand I thought it would be clear sailing. Not so, but like every other fool out to save the world, I dashed right in.

Antenna Feedline

The Yaesu FT-23R has a BNC connector for the antenna but it would have to be brought outside the ammo can. I installed an SO-239 connector on one end of the ammo can and brought a short length of double-shield coax to a right-angle BNC connector. To insure there would be no RF leakage inside the box -- the bare TNC board would only be an inch away from the radio -- I added a third shield over the antenna lead, securing it to a UF-13 shield that completely covered the SO-239 connector on the inside of the box.

Since the case of the FT-23R is cast aluminum, it appeared well shielded by design so I took no special precautions. (So far, it seems to have worked out; I`ve seen no signs that RF leakage is a problem. The TNC responds normally and I`ve found no birdies in the HT.)

Making a Small HT Smaller

I couldn`t use the regular battery pack -- power output was too low -- so I removed it and put it aside, which results in a radio about two inches on a side and an inch thick -- they can`t get much smaller than that, not and put out five watts. (The FT-23R delivers an honest 5 watts when powered from a *12vdc source.*) The trick was, how to feed it 12 volts?

After some serious fumbling I designed the power connector shown in the photos. It uses the

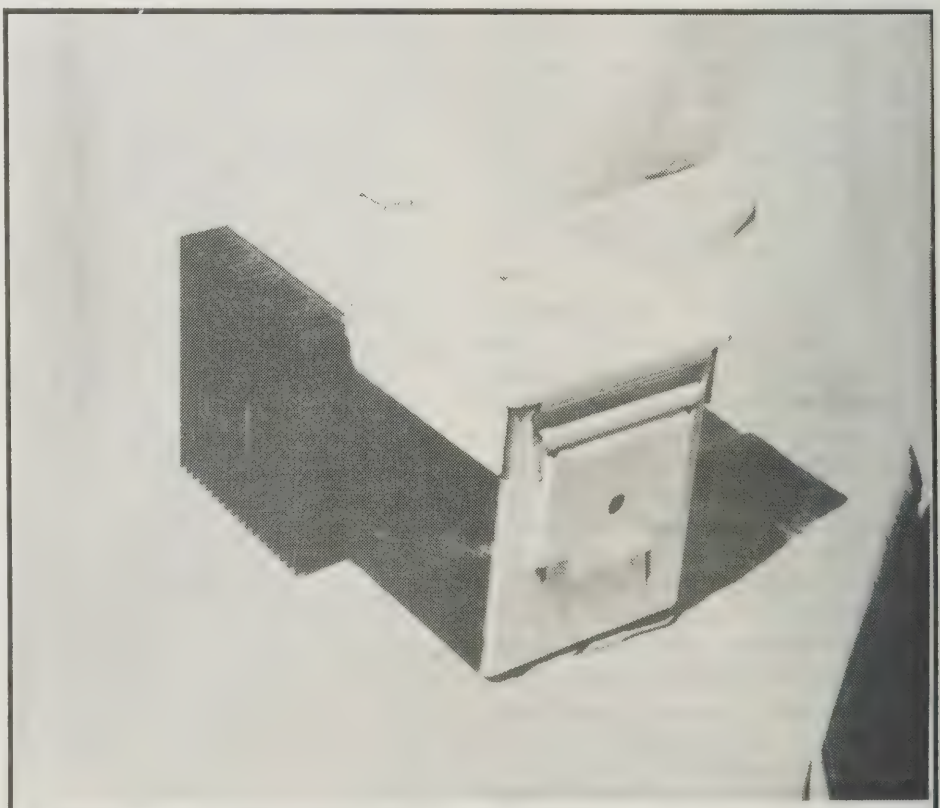

Photo 6. Exterioir view of ammo can showing heat sink and black radiating surface.

original battery pack rails on the radio and locks in place. I`ll give you all the details and dimensions so you can make up a couple for yourself, in a following article. (I`ll also show you a low-cost 12v @ 8 amp/hr battery-belt I came up with for the FT-23R -- handy to have during an emergency.)

Panel Lamp Needed

The FT-23R uses a combination keyboard plus an LCD display instead of thumb-wheels and the panel is on the front of the HT, which meant it had to be mounted on its back in order to read the frequency. I made a little fixture to hold the HT face-up on the bottom of the can and fastened it in place. Fine. Except I couldn`t read the display.

The FT-23R doesn`t have a panel lamp and since it uses an LCD display, you can`t read it in the dark. Positioned down inside the ammo can the display was hard to read in anything other than good sunlight, and a fire might not wait for high-noon to let you set your frequency. I needed to provide a light; an external lamp of some sort... and a bracket, switch, etc. Fiber optics? Internal lamp? I finally settled on a small base-less dial lamp from an old CB rig, wired through a switch, with a cobbled-up bracket to hold the lamp close to the FT-23R display panel.

The HT installation now worked quite well. You could read the display with ease and the small size of the unit meant I could use a slightly larger battery than I`d originally planned for. I ran some tests and was feeling rather smug.. until it got warm. Sealed up, the ammo can trapped the small amount of heat produced by the HT, and from the chemical action of the battery. The heat caused a tiny seed of worry to spout -- if it got *too* hot... I mulled this over but couldn`t see an easy solution and put the problem aside to be resolved later.

Mounting The TNC

The MFJ-1270 had to shed its shell. There`s no room for the cabinet in the ammo can and it really isn`t needed -- the can itself makes a stronger chassis and is RF tight when properly sealed. Removing the board from the cabinet takes only a minute but be careful when you free the LEDs.

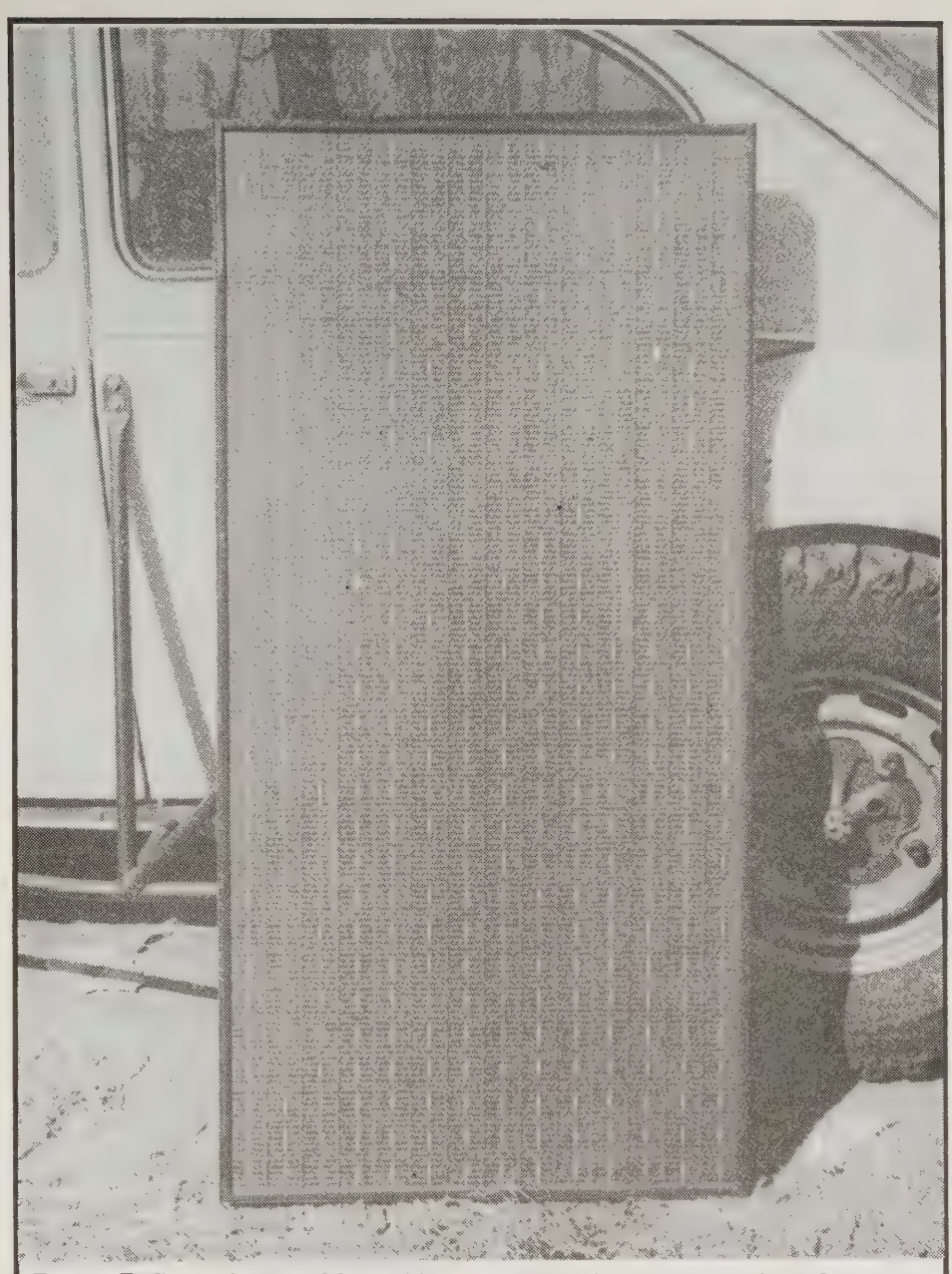

Photo 7. Sovonics R-100 (and 'Doom Buggy'). Panel provides 2 amps at 12v; substrate is stainless steel!

The MFJ-1270 must stand on edge to fit in the ammo can. And it has to go on an energy diet as well -- it uses too much power for portable operation.

I mounted it on 1/2" metal stand-offs to provide clearance and air space, and drilled the side of the ammo can to match. To allow the lid to close I used flat-head screws, and since the ammo can is made of thin steel, I had to dimple the holes slightly. (None of these things were immediately apparent, each had to be discovered and a solution found which would not impact some other part of the project. This translates into *time*. Something described in a single paragraph in this article often took a week to figure out.)

Although the MFJ-1270 is 12vdc unit most of the TNC runs on 5vdc, provided by an on-board 7805 in a TO-220 package. I adjusted the position of the board so the heatsink on the 7805 made firm contact with the end-wall of the ammo can, sanding away the paint

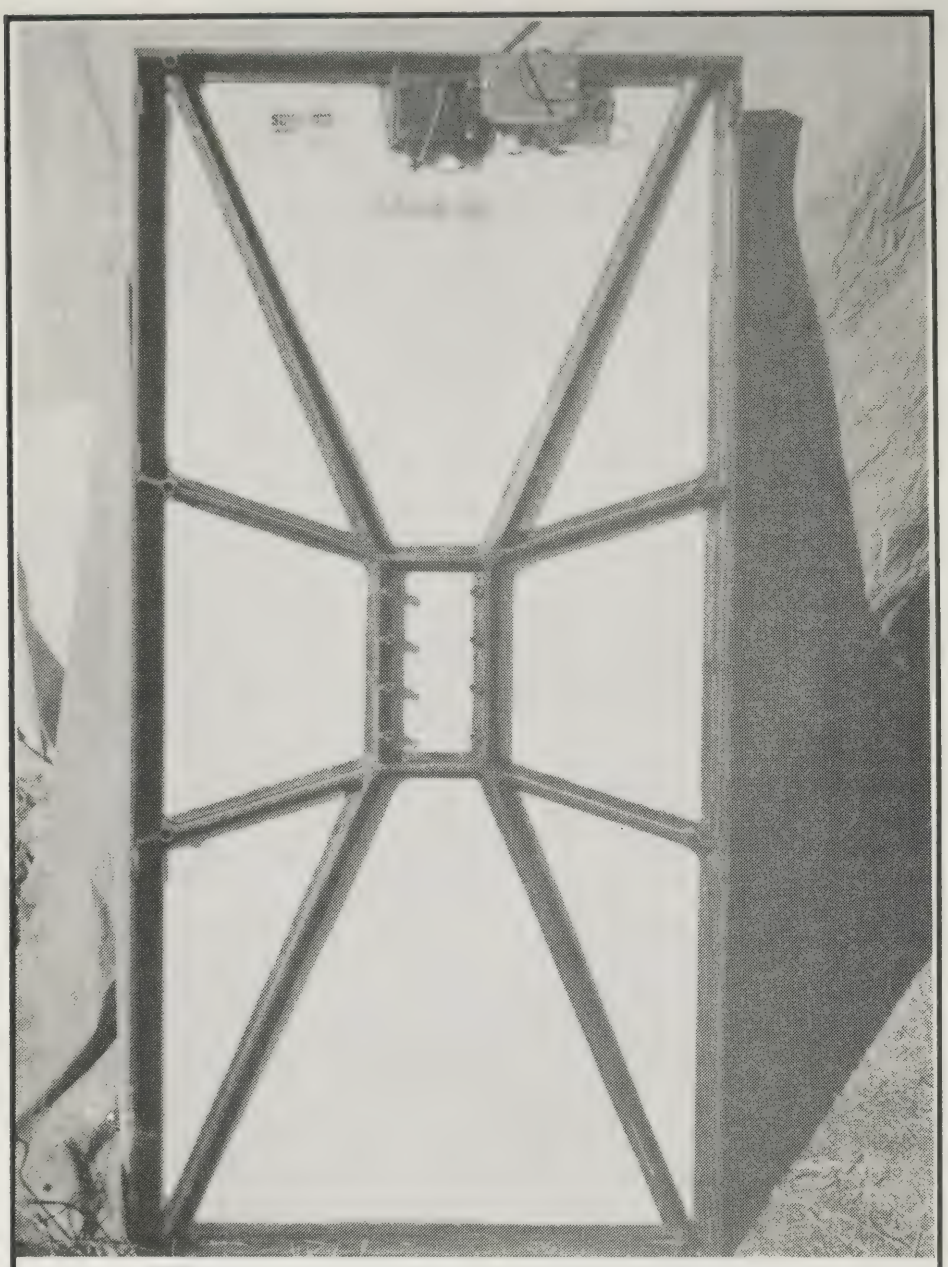

Photo 8. Sovonics panel (rear view). Portable controller (box on right) installed. Frame is cast polycarbonate. Note numberous cast-in-place mounting points.

at the point of contact, and providing a thin coat of heatsink compound to insure proper heat flow.

Connections were no problem -- at first. The interconnections between the TNC and the radio are exactly the same as for normal packet operations. During my initial tests I used the same cable I`d made up for regular packet work, running the Audio-Out and PTT through a small transformer to satisfy the combined Mic-Audio /PTT line of the Yaesu FT-23R.

The connections to the computer/terminal are unchanged; if you saw "Picayune Packet?" in the February **CTM** you can use exactly the same cable to connect the unit to a VIC, C-64, or C-128. (I used a VIC during most of my tests.)

Remove the LED`s

The five LED`s on the front of the TNC account for quite a bit of the power used. Since the TNC would be unattended and the LEDs concealed inside the ammo can, I removed them. Then found I could not do without them!

While the Lunch Box is *intended* for portable, unattended use, odds are it will spend most of it`s life on the back of your bench, serving as a regular packet station.

If left in their original locations, the LEDs would be concealed deep inside the ammo can, impossible to use for day-to-day Packet. They had to be easily visible, which meant a place to mount them - a panel of some sort. I used á scrap of circuit board, grinding lands on the underside as solder pads. And since I didn`t want wires strung all over the place, I installed a 10-pin (2x5) header to the LED lines so I could use standard rainbow cable and connectors.

Forced to use a panel to mount the LEDs, it seemed logical to make it large enough to mount the other controls and indicators as well. I tried about several layouts before coming up with the one it the photos -- like most stuff in emergency service, it`s a compromise -- a little bigger than I wanted; a little smaller than I needed -- but good enough for now.

I put a switch in-line with each of the indicator LEDs; when operated as a portable digi you can turn them off to conserve power. (I wish I could shut off the Transmit/ Receive LEDs on the FT-23R; with no one to see them they serve no purpose but to consume power, and managing your energy budget is your most critical task.)

After several trials, I also added a 'Power On' LED, but adjusted the current to a bare minimum. In bright sunlight you can`t tell it`s on but the position of the switch gives you that. At night, of course, it`s easy to see -- a tiny ruby spark -- which was the whole idea.

During a big fire or other real emergency there`s a good chance we won`t have enough hams to go around; the digi may have to be set-up and put in place by a non-ham. I made the controls as clear as possible, and spent a lot of time making up a simple, single-card set of instructions that goes in the box. Frankly, this was one of the toughest parts of the project and its success depends greatly on being able to pre-program the FT-23R and the TNC.

Power For The Digi

If there is no signal present to break the squelch, the FT-23R draws only 25 ma but high-power transmit can bump that up to 1.5 amps. The TNC is a bit of a power-hog. Even without the LED`s it guzzles about 100 milliamps. The 'POWER ON' LED takes approximately 3 ma; you may have to try several to find one which will light-up at that low a current. (I used one of those tiny [.114 dia.] high-intensity jobbies.)

The ammo can determined how large a battery I could use, my budget decided how *good* it would be; nicads for example were out -- too expensive. I finally settled on a 14 amp hour motorcycle battery. Fully charged, it will power the unit for more than 60 hours of normal operation; a lot less when running 50/50.

Regular motorycycle battery-cable connectors were too large and cost like the dickens. I made some up from .025 sheet copper stock, punching a 1/4" hole to accommodate the battery-post bolt. (Thin copper is pure hell to drill; punch it, and save yourself some grief.) Lead/acid batteries love copper, they eat it for lunch. Flow a heavy coat of solder on the connectors to protect them. The battery has a vent tube brought outside the ammo can but there`s bound to be some vapor loss over time.

To keep RF and glitches from circulating through the power leads I scattered lots of ferrite beads on the leads, sealing and holding them in place with heat-shrink tubing. See the photo of the cable harness.

That seemed to wind it up. Seven months of work and and some hearty support produced a portable digipeatear neatly housed in an ammo can. Nothing to it. (It`s true you know; ignorance *is* bliss!)

Functional Testing - Part One

To test the unit I hung it in a tree down the hill from the house and told the Portable Kaypro to bang it every 10 seconds with a lengthy beacon message. I dialed-in a quiet frequency where I wouldn`t bother anyone and left them to it, HZF-1 beaconing via HZF-2. (HZF [-0] is my Portable Pakratt, permanently mounted in a 1967 Volkswagon Bug.)

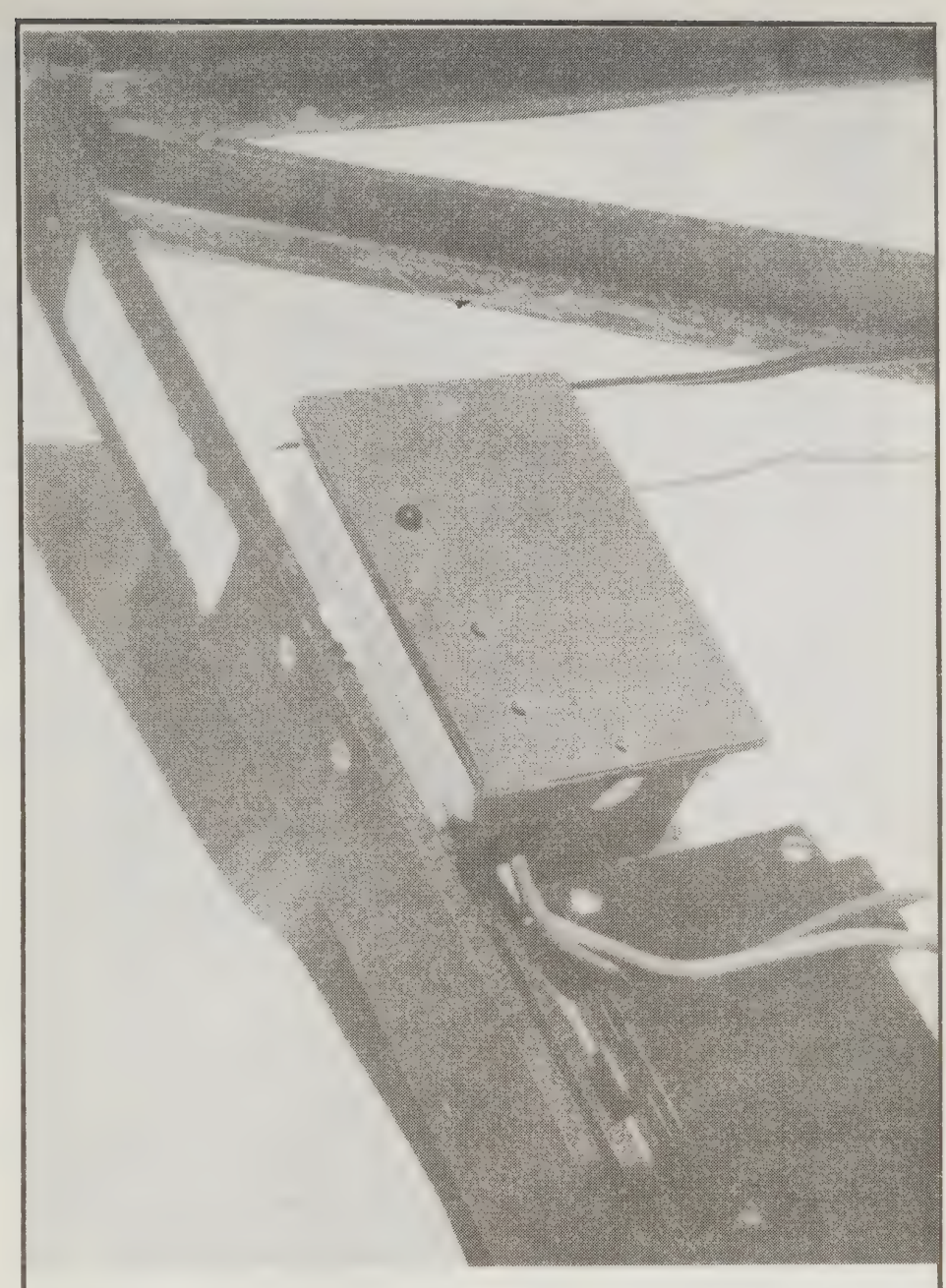

Photo 9. Portable Solar Controller. LED may be disconnected to conserve power. Holes allow set-point adjustment of sealed unit.

At first I chugged down the hill every couple of hours to check the battery voltage but that got pretty old after a while. By the second day it was down-right boring and on the evening of the third day -- after 68 hours of operation -- I ended the test. Battery voltage had dropped to 10.2 volts but all systems were operating normally. Because the TNC is actually a 5v device, it`s happy all the way down to about 7.5 volts on the battery. The only change in the FT-23R is reduced output as the battery voltage falls.

But I still had the heating problem.

Getting Rid of the Heat

With the TNC`s 7805 dumping its waste heat into the wall of the ammo can, and with the FT-23R transmitting only six seconds out of sixty, heat build-up was not a problem, particularly since the portable digipeater was in the cool shade of a large avocado tree. But

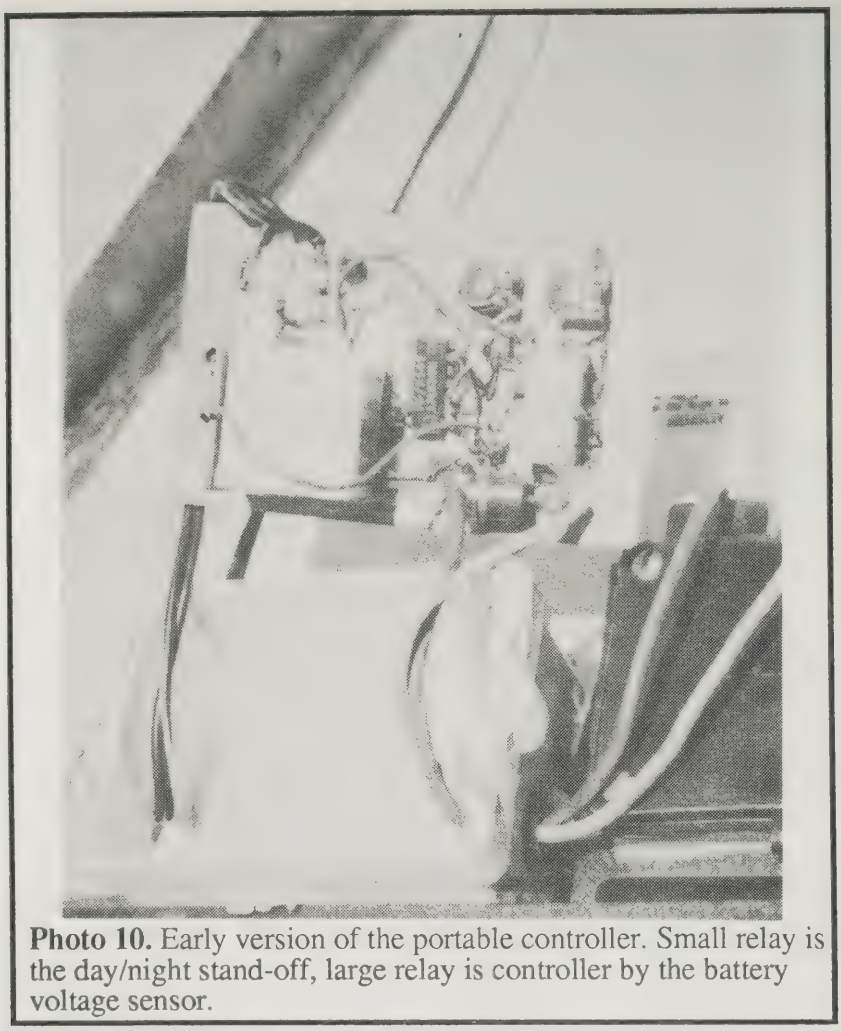

Photo 10. Early version of the portable controller. Small relay is the day/night stand-off, large relay is controller by the battery voltage sensor.

when the transmit/receive ratio edged toward 50%, everything started to heat up and the output of the FT-23R began to drop.

If the ammo can was in direct sun, the problem got serious in a hurry -- the dull olive drab paint soaked up the sun`s heat and the *interior* temperature quickly climbed to more than 120o F.; the sunny-side of the exterior was even hotter. Things started going wacky, power output dropped and you could see the rig was having trouble.

I had to reduce the amount of heat coming *into* the can, and figure out some way to pump heat *out* of the can at the same time.

I dismantled the ammo can and took it down to bare metal. I gave it two light coats of zinc chromate then painted five sides of the box with gleaming white two-part epoxy. The sixth side got a single thin coat of flat black, the idea being to face the dark side toward the north and allow it to act as a radiator; the white paint would reduce solar heat absorbtion by about 17%.

This simple paint job did quite a bit to reduce the *interior* temperature in the can... so long as the FT-23R wasn`t transmitting... or the battery was not being charged. But start using the radio or recharging the battery, and the temperature began to climb back up again.

I couldn`t do much about the heating from the battery -- about 10% of the charge/discharge energy will appear as heat -- and the regulator on the TNC was already well coupled to the can. This left the radio. I mounted the FT-23R on a 1/2" thick aluminum plate, incorporating the dial lamp into the fixture clamping the radio to the plate (see photos). To bond it to the wall of the box I built a heavy aluminum angle, removed the paint, applied heatsink compound to the interface, and bolted it down with three 1/4"-20 copper bolts.

Once again, you could measure the change -- now the whole box got hot!

Obviously the heat was circulating in the steel shell of the box; my black-surface radiator wasn`t radiating well enough.

The side of a .50 caliber ammo can is about 11" long by 7" high. The lid overlaps the side -- there`s a 2" high lip on part of the lid that forms the feed-tray when the ammo can is used to fuel a flexible-mount .50 caliber machine gun. This lip reduces the radiator surface to about 5" by 11" = 55 square inches of radiator area; obviously not enough to deal with insolation (ie, heat from the sun) and waste heat from the FT-23R, TNC, and battery.

Since air was the working fluid (gasses and liquids are both 'fluids' when calculating heat flow), my only recourse was to increase the radiator area and that meant adding a finned heatsink to the dark side of the box. I went scrounging for a big heat-sink, lugging the Lunch Box with me. Merit Arnold, W6MLO, owner of RF Parts Company in San Marcos, took an interest in the project and gave me a huge Thermalloy heatsink 5-1/2" high by 6-1/2" wide with 18 fins. The sink was 1-1/4" thick; each fin was 1" high by 5-1/2" long (see photo). I had to notch the lid slightly to allow it to close and removed the just-applied paint job where the heatsink was to be mounted: even a thin coat of paint will reduce the flow of heat from one surface to another.

Maximum heat transfer and the lowest thermal resistance calls for dead-flat surfaces, as on Jo-blocks (ask a machinest!). Unfortunately, the side of the ammo can wasn`t truly flat, the thin metal had lots of minor bulges and dips you`d never notice... unless you were trying to pump heat out of the box into the heatsink. To make as good a bond as possible I used 12 copper bolts (including the three used to secure the radio shelf) and a rather thick layer of heatsink compound. Most of the compound squeezed out as I torqued down the bolts (work from the center to the edges) but that was the idea; to leave as thin a layer as

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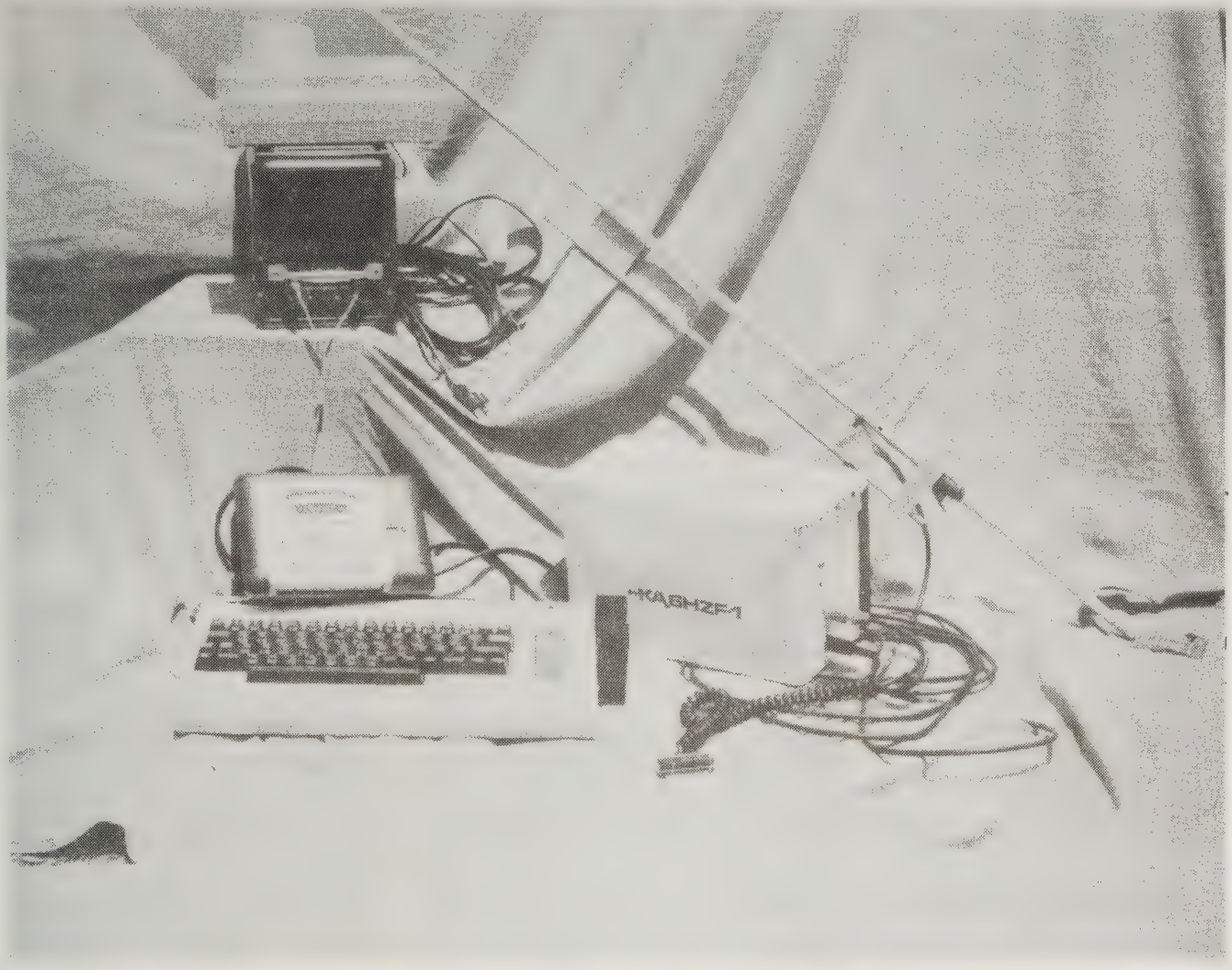

Photo 11. Complete man-portable Packet station. Note 12v printer and 5 inch monitor (in ammo can). Monitor contains 12v 8A/hr gel cell; powers computer and printer; recharged by connection to digipeater (Sovonics solar array not shown). Antenna is home-brew J-pole.

possible but to fill up the dips and bulges.

I tapped the heatsink to take the bolts, etched it with Alodine, and gave it a thin coat of flat black before I mounted it. Inside the can each bolt was mounted through a thick, large diameter fender washer to distribute the compression evenly and -- hopefully -- make the bond between box and heatsink as uniform as possible.

The result of all the work was better than I`d hoped for. Even in full sun, with the battery being charged and radio going flat out (50% xmit/50% rcvr, the maximum for *any* digi -- think about it), the box stays at a decent temperature, so long as the fins are not struck by the direct rays of the sun.

As a last step I made a heat-shield for the south side of the can to shade it from the sun. Nothing sexy, just some heavy aluminum foil formed into a rough shell. The foil is tough enough to stand being wadded up and stuffed in your pack; just smooth it out and re-shape it when needed -- but be sure to anchor it securely so the wind won`t carry it off. (And as a *last* last step, I stored a tiny compass inside the can -- If you`re setting up the digi at night, with the sky obscured, which way is south?)

Ten Days or Bust!

I now had a functional system that worked extremely well -- in the shack. But the battery could only power it for about three days. To meet the ten-day endurance spec I had to be able to re-charge the battery and the only practical solution was to use solar power.

My solar panels are junk -- really. Three years ago I bought five of them for $125 as pulls from oil rig instrumentation stations. All had one kind of problem or another -- open cells or a bent frame or missing connectors -- junk. To return them to service I used cells from one of the panels to repair the other four, made up frames and junction boxes, and mounted them on my garage roof. I built a sturdy controller in a hefty chassis and screwed it to the wall near the battery bank. Then I blew a razzberry toward the nearest power station. (Surprisingly, the system works pretty good.)

Each panel weighs about 20 pounds, has 42 cells, and puts out about 1 amp at 18 volts under full-sun conditions. They are polysil-

icon units and perform well only under direct sunlight. Given cloudy -- or smokey! -- conditions, their output drops dramatically. To insure the portable digi could stay on the air for the ten day minimum I would have to use *two* of the panels to keep the battery charged.. and I`d need the controller as well.

This looked easy enough until I got to the actual field testing. Stacked up alongside the Volkswagon, the equipment made a respectable pile: a home-made J-pole, a two-section, ten foot mast, two solar panels, the controller for the panels, and the portable digipeater in its gleaming white ammo can. Add to that the pack frame, a gallon of drinking water (anything less is suicide in the desert regions of California during the fire season) and various necessities required when you go off in the wilds on foot. The load topped out at 86 pounds.

Functional Testing - Part Two

Man-portability is one of the critical specs for the system and in my book a fair test would be to hump the thing out into the boondocks, set it up, and play a little Packet.

For the test I chose a local rock pile up on the south flank of Mount Palomar. I knew I could hit a number of voice and digital repeaters from there, as well as having a clear shot back to the shop, where I`d leave the Kaypro beaconing via the Lunch Box on a little-used frequency.

Before leaving the house I connected a terminal to the portable digi and loaded the various parameters into the TNC, making sure the two systems (Kaypro and Lunch Box) were talking to each other. Leaving the power on, I unplugged the terminal, buttoned up the ammo can and was ready to go.

I`d picked a week-day (slathers of tourists on the weekends) to drive up the mountain -- it`s about 40 miles from the house -- saddled up, and eventually got to the top of the rock pile. It`s close to the road but it took me over an hour to clamber to the top. The rock is weathered -- or 'rotten' -- granite; slip and you`ll think you`re on ball-bearings.

After my heart slowed down to 2,000 rpm I set up the digipeater. One of the solar panels was dead, victim of being banged against a rock, but I went on the air okay, on voice, through the Palomar Amateur Radio Club Repeater. Since the FT-23R is bolted down you have to bend over close to the open ammo can and... sort of shout. Scares the hell out the chipmunks.. but it works. (Don`t forget to unplug the mic and audio leads first.... and to plug them back in again!)

Then I tried it with packet.

I selected a packet frequency and waited for some hits. Sure enough, the FT-23R winked now and then showing the squelch had been broken by a signal. But nothing from the TNC; the DCD light should have winked every time the HT copied a signal... but it didn`t. I unplugged the speaker line and could hear the *rasp-braap!* of Packet signals, but the TNC refused to play the game. I moved over to the frequency where I`d left the Kaypro banging away and copied it clearly by ear but the TNC, which should have retransmitted the beacon message, just lay there. Ummmm Bad parameter? Timing wrong? Did I change the SSID? *Without a* ***terminal*** *I couldn`t find out what was wrong;* I had no choice but to pack up and head back down the mountain

In the shop I found -- and corrected -- a simple but very stupid error. Another stupid error was going up the mountain without a terminal.

Functional Testing - Part Three

Weather delayed another trip to the mountain and I used the time to repair the solar panel (open cell; glued on a spare), and worked-up a terminal to take with me the next time I headed for the rock pile. I made up a cable and 5vdc supply for the C-64 that would plug into the portable digipeater`s battery. For a video I used a 5" black & white TV set. To load the terminal program I packed a Datasette unit as well. Datasette (with cable), C-64, 5" TV, regulator unit (with cables), and a cable for the video. My pack now weighed 104 pounds, according to the scale at Peto`s Feed & Grain in downtown Vista.

This time I didn`t make it to the top. I was sort of played-out when I reached the rock pile, got careless, and took a pretty good fall down a short -- but steep -- incline. I banged up another solar panel, busted the Datasette, and didn`t do my right knee much good. I felt lucky to get back to the road.

In Search of Practicality

It was just too heavy; at least for me. (Man-portability implies the man can still *move* once he gets the sucker on his back!) I could split it into two loads but to be fair that would be Two-Man-Portability. I began to wish I was Arnold Schwarzenegger.

A VIC weighs less than a C-64 so I went to the VIC. But a VIC doesn`t have a video modulator -- to use the 5" TV (the lightest video display I had) I'd need an outboard video modulator. The VIC-plus-modulator weighed about the same as the C-64.

The solar panel controller was designed to mount on the wall of the shack -- I could lighten it considerably but only by building a new one from scratch. Started doing that.

The solar panels have an aluminum frame; not very heavy, but some do. Removed the frame and discovered rough handling in the shop was enough to break the connections between the cells! Replaced the frames; repaired the panels -- I was running out of replacement cells.

Tried to use one of those tiny LCD screen TV sets as a video display -- the characters were too small to read.

One of those lap-top computers from Radio Shack might help -- they don`t weigh much and I understand they have a built-in modem and program. I checked them out and the price tag was enough to scotch that idea; they cost several hundred dollars. Back

to my $10 VIC.

Chet Lambert and His Magic Wand

By this time it was April, 1987; I'd been working on the portable digipeater almost a year. But to every other ham in the world, April means Dayton, DARA and the Gathering Of The Clan.

Chet Lambert called to nail down some deadlines and during our chat I mentioned the problems I was having. He was leaving for Dayton the next day and - obviously in a rush -- wished me luck in finding a solution, but didn't seem interested in my deep blue funk. Or so I thought.

At about 2:30 pm, Sunday, the 26th of April, I got a call from Mr. Nick Pietrangelo of "Power By Sun" (P. O. Box 190, Spring Lake, Michigan 49456). Had I heard about the new Sovonics solar panel? (Yes! Lusting in my heart. ..) Could I use one in this project Chet Lambert had mentioned? ***(Could I!)***.

Waiting for the solar panel to arrive -- and still not believing my luck -- I designed and built a **portable** solar panel controller. It wasn't very sexy but it was **light!** -- a scant nine ounces.

The Sovonics Solar Panel

The arrival of the Sovonics panel was an instant education in how far photovoltaics have advanced from my primitive polysilicon arrays. It's an amorphous type, vaccum deposited on a stainless steel substrate using a propietary process developed by Energy Conversion Devices, Inc., parent corporation of the Sovonics company. The amorphous structure of the photovoltaic cells means the panel doesn't have to be aimed precisely at the sun; it doesn't even *need* full sun. If a photon hits the panel -- at almost any angle -- it produces *some* power. The obscured-sky performance was absolutely amazing -- smoke, haze, fog or clouds, the Sovonics panel kept the battery fully charged.

The panel puts out an honest 2 amps and best of all -- especially when you're climbing rock piles -- it weighs only 11 pounds. In one move Nick Pietrangelo and his Sovonics panel lightened the load by 30 pounds -- and guaranteed a fully charged battery at the same time.

I'm amazed at how *tough* the panel is. There's no glass in the thing; the stainless-steel panel is sealed in polyvinylfloride -- Tedlar -- the ultra-stable plastic which has largely replaced Pyrex. It's actually more transparent than glass yet as flexible as vinyl and almost completely inert -- you can boil the stuff in nitric acid and it just grins at you like Sam Magee.

The frame is a polycarbonate casting, light and strong. After some experimentation, I attached a screen door handle at the balance point and rigged a rope sling; the Sovonics panel is a tremendous accomplishment but it was *NOT* designed to be humped through the brush -- as I would discover.

Two weeks after receiving the panel I chugged up my favorite rock pile at a rate of knots, gayly bashing the Sovonics solar panel against the boulders without a care in the world -- you couldn't hurt it if you threw it under a bulldozer.

I stayed there through a long afternoon, watching the sun slide into the Pacific. With a complete terminal I was a one-man communications station and from my +5,000 foot elevation I was able to bang digis over a hundred miles away with the healthy *braaap* from the tiny Yaesu. It was May; I'd been working on the project for eleven months.

The Long Test

Okay, the portable digi was *really* portable, the battery had enough capacity to carry it through a couple of coal black days and the new Sovonics solar array had more than enough output to operate the rig and recharge a depleated battery at the same time. But was it *good enough* ? There was only one sure way to tell.

For this final test I chose a remote spot on the northwestern flank of Mount Palomar above the Pechanga Indian Reservation. The site is a sharp ridge between a pair of deep canyons at about 4,800'; it allows an unobstructed radiation pattern of about 250º, blocked only toward the desert, to the east and south-east. A cliff-like scarp blocks descent from above and a mile of brush and the 45º slope guards against assent from below. Once on the ridge, I figured the equipment would be safe from theft.

I thought I'd have no trouble reaching the site; it's close to a fire trail and I'd be working across the slope -- no steep climbs. But it was a couple of years since I'd been there and the brush was almost impenetrable. What's more, the Sovonics panel seemed to grab every bush.

The panel is about 2' by 4', a light but rather clumsy load to pack through the brush. The handle I'd installed was a big help in guiding the thing and a rope sling over my shoulder carried most of the weight, but it was still an awkward load. Sovonics also makes *flexible* arrays -- you can roll them up and stuff them in a pack! I began to lust for one before I'd gone a hundred yards. It took more than two hours to go less than a mile.

To reach the ridge required a bit of hand-jamming to cross the head of the south canyon. I broke down the pack and after some hesitation, left most of my gear -- including my big canteen -- on this side, carrying over only the digipeater. (That was a stupid decision, **NEVER** leave your water behind.) I took the Sovonics panel across by itself -- and found it makes a nifty sail.

Like the first tests, I set up the digipeater on a rock pile. On the brushy slopes it's the only way to get a clear shot at the sun. I put the Lunch Box in a deeply shaded groin between two boulders and speared the camouflaged J-pole into a dense manzanita. The brush was so thick it didn't need to be guyed. The solar array was laid out about 15 feet away in a place open to the southern sky.

Connecting the VIC as a terminal, I did a self-connect via the Kaypro back at the shop and sent myself a rude message. The system was working okay and my

message aroused no interest. I reset the parameters for digipeater operation (CONOK = OFF, etc.). One last check of the cables, a little brush to cover the Lunch Box, and I left it there.

Nail Biting Time

Figuring $140 for the MFJ-1270 TNC, $350 for the Yaesu FT-23R, and $250 for the Sovonics solar array, I`d just dumped over $700 of new equipment out in the brush, free for the taking by any thief who happened along. I didn`t get a lot of sleep for the next ten days.

I told the Portable Kaypro to hit the Lunch Box every ten seconds with a 128 character beacon message. With the SSID of the portable digipeater listed in the UNPROTO as a VIA address, the beacon message would be rebroadcast by the portable digi until I shut it off or the battery ran down. Or until someone ran off with it.

Hour after hour, day after day, the Kaypro banged out the message. Forty miles away and high up the mountain, Captain Kirk`s Lunch Box repeated it.

With the Portable Pakratt (i.e., C-64 and AEA PK-64) in my Volkswagon, I drove all over San Diego county listening to the 5 watt signal from Captain Kirk`s Lunch Box, plotting the pattern on a map. I dropped across the border at Tecate and took the back road into Tijuana. I could copy the signal easily from the hills behind the town.

I took a run up north; the signal was loud and clear in the western part of Riverside county, fairly strong in parts of Orange and Los Angeles counties -- plus a few Black Holes. Every ten seconds. Hour after hour. For ten full days.

Late on Friday night I drove up the mountain and collected the system. The J-pole was canted over, perhaps from a bird landing on it, and some the camouflage netting (ragged strips of nylon stocking) were gone. Another bird? Nylon nests?

Battery voltage was 13.6 vdc. There was some bird crap on the solar panel and signs of a couple of rain showers but other than that, the system was working fine. Judging from the water level in the battery, it could go unattended for months at a time. I hauled the thing home and sat down to write this article.

Did It Work

I`m not the only guy working on the problem of portable digipeaters but I think my approach follows a more practical line than other projects I know of. One group took the same specs -- and wound up with a **converted school bus(!)** Another uses a Honda generator -- but makes no provision for ten days of fuel.

(When an emergency response agency asks for man-portable equipment and the Amateur Radio community responds with a **school bus** it`s easy to see why they don`t include us in their emergency planning.)

The thing works, not just well, but damned well. Considering all it will do, it`s cheap insurance and would still be inexpensive at twice the price. It`s highly portable; if *I* can get it up the mountain, anyone can, assuming they aren`t wearing an iron lung. And it`s a tough little rig -- my pretty paint job shows enough gouges and dings to make you wince.

I think it`s fair to say **Captain Kirk`s Lunch Box** meets the specs for an emergency digital repeater. Now the question is, will the Amateur Radio community agree? Will anyone follow my lead? Or will we continue to be Cursed with a Plague of converted schoolbuses.

-*-*-*--*-*-*-

This came out more like a Norse saga than a 'How-To' construction article but don`t give up on me yet. Coming down the pike will be a couple more articles on Captain Kirk`s Lunch Box giving you details on the solar controller, the modifications to the TNC, and so on. Keep an eye peeled -- and tell your friends.

Captain Kirk`s Lunch Box?

While trying to solve the heat build-up problems I wired the box with a several electronic thermometers. On the way to the patio for another sun bath, the phone rang and I sat the box on the kitchen table while I answered it. My wife, Jaysie came into the room, took one look at the digipeater, and cracked up. "What in the *world* is *that*!" she laughed, "Captain Kirk`s Lunch Box?"

With the large black heatsink hanging out one side and the festoon of colorful wires going to the heat sensors, and the constantly hunting characters on the LCD displays of the temperature readouts, it *did* look a trifle odd. I started to explain what it was, why I was working on it, the problem with heat flow... Jaysie just waved me away and walked off, still laughing. To this day the portable digipeater is "Captain Kirk`s Lunch Box". (Yes, I`m married to a *Trekkie!*)

A Note of Thanks

On my own, this project would never have been completed. **Yaesu, MFJ,** and **Power-By-Sun** deserve not only my thanks for their assistance, but yours as well -- without their help I would have been dead in the water and **this information would not have become available to you.** I want you to think about that for a moment. Sure, they had a commercial interest, but without exception, the people I dealt with **appreciated the *need*** for such a device. These are not small men by any measure.

Most of all, we owe a debt of gratitude to Chet Lambert. From the outset he thought the project worthwhile and spent many hours discussing it with other people, using the persuasion of his conviction to gain their support for the project. Thanks, Chet. You may have just saved a few lives.

Robert S. Hoover, KA6HZF
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By Robert D. Hartung

Musings AND Meanderings

Dis & Dat On DOS, Part 1

Probably no other T/S hardware add-on makes more difference in programming and processing techniques than when cassette data storage is replaced or supplemented by a disk operating system (DOS). Not only is there immense improvement in speed, reliability, and convenience in the storage and retrieval of programs and data, but files can be randomly accessed with almost insignificant interruption during a running program. For those who have a DOS, as well as as those who have not yet made the leap, sharing some of my own learning experiences in adding a DOS to a TS2068 might be of interest.

In contrast to the sequential storage on tape of one file after another, a random access DOS neatly packs each track of data concentrically inside the ones adjoining it on a disk. This allows retrieval of any file on any disk in the sytem to commence in as few as three revolutions of the disk -- one for it to come up to speed, another to read the catalog data, and the next to step the head to the track where the file begins. This can be done much more quickly than physically moving an entire length of tape to a catalog file at its beginning each time a save or load is called for and then running through the tape to the selected segment. By its very nature a DOS also avoids many of the problems an endless tape-loop system is prone to.

In effect, then, a DOS can provide an extended non-volatile RAM that is limited only by the type of system and the number of drives being used with it. In order to understand why some systems can access data more quickly or put more data on the same disk than others it might be helpful to take a look at some of the factors involved. First of all, the drives themselves could be anything from the single-sided 8" type to the 5 1/4", 3 "1/2", and 3" double-sided or quad-density (DSDD or DSQD) that have largely superseded the 8". A special DOS (along with lots of bucks!) is required for the hard-disk drives that can store 120 megabytes and up, so for purposes of our discussion, we will consider only the commonly used 5 1/4" DSDD and QD drives which are capable of storing up to 425 K-bytes and 835 K-bytes, respectively, per disk.

The interchange of data and control of drive functions is accomplished by DOS driver software and firmware that is usually on EPROM so it is immediately enabled on power-up and also has its own RAM which does not take up computer memory. Before a disk can be used for storing data, the magnetic coating on its two surfaces must first be formatted to the number of tracks and sectors required by the particular drives and DOS driver program being used with it. Tracks are defined as narrow concentric circular bands, up to 96 per inch (TPI), in which data will be recorded as the disk turns. Each track is divided into sectors by putting down magnetic markers at intervals, such as ten 512-byte sectors per track. A file catalog along with information for indexing the movement of the record/play heads is usually stored for reference on the first track of each disk.

For most efficient usage of all available storage, some "bit-mapped" systems make use of the first available bit of the first available sector each time a file is saved, no matter where that sector may be on a disk, and if more room is needed the head may then jump from that sector to the next open one, and so on. Each step or movement of the head takes time, especially if the files have been revised several times to scatter unused sectors all over a disk, so at the cost of not packing every sector of every track absolutely full of data, other systems, such as the JLO SAFE V2.32 I have, allocate disk space in 5K "cylinders" (all of one track on a disk-side). These cylinders are allocated consecutively, from side to side, so that after the file catalog and head-indexing info has been stored or retrieved at track 0, with the least possible stepping movement the heads will record or read from one track directly after another, alternating sides. With 5 1/4" DSDD disk costing as little as 25-55 cents each when bought in quantities ($5-10 per box of 10), the trade-off of unused disk space for greatly increased speed and simplicity of access is an important

consideration.

Of course, programs and access techniques must be adapted to make the best possible use of all DOS capabilities. Since unlike a cassette tape system an exact name must be used to access each disk file, menu-driven file selection that requires only a single key press greatly reduces the actual access time. The JLO manual includes the listing for such a routine that automatically catalogs and provides access to every file on a disk, in 18-item pages up to the maximum 177. It is called up from a special file 0 by simply keying LOAD/ ENTER.

For some purposes, especially for frequently-used utility or data-base disks from which a relatively few main programs may in turn call up other reference files from within themselves, it may be simpler to display just these main titles only for immediate access. While requir-ing that each file title be initially entered either manually or by a main program subroutine, the following file selection (LISTING 1) displays up to 36 titles at a time, any of which may be accessed by a single key-stroke. As given, it will fit into the 1.5K-byte JLO file 0, from which it may be called up by keying LOAD/ENTER. With a few changes it can also be used with another DOS.

Listing 1.

```
  10 LET I=SGN PI: LET o=NOT PI:
 POKE VAL "23658",o
  20 CLS : REM DIM 0$(36,11)
  30 FOR j=I TO VAL "36"
  40 PRINT AT j-I-18*(j>18),16*(
j>18);CHR$ (j+47+39*(j>10));"=";
0$(j)
  50 NEXT j
  60 PRINT #o;AT o,o;"KEY:     0-
1 OR a-z TO LOAD       A TO CHANG
E NAME   B TO ADD FILE": PAUSE o
: PRINT #o;AT o,o;,,,,
  70 LET SEL=CODE INKEY$-47-39*(
CODE INKEY$>57)
  90 IF SEL=VAL "-20" THEN FOR j
=I TO VAL "36": IF 0$(j,I)=" " T
HEN INPUT "New filename",0$(j)," "
ABS OR S? ";0$(j,VAL "11"): CLS
: SAVE /0: GO TO I
 100 NEXT j
 110 IF SEL=VAL "-21" THEN PRINT
 #o;AT o,o;"ITEM TO CHANGE",,,,:
 PAUSE o: LET SEL=CODE INKEY$-47
-39*(CODE INKEY$>57): INPUT (0$(
SEL));" (Old name)", LINE 0$(SEL
)'"ABS OR S? "; LINE 0$(SEL,VAL
"11"): SAVE /0: GO TO VAL "30"
 120 IF 0$(SEL,VAL "11")="S" AND
 PEEK VAL "149"=VAL "93" THEN PR
INT #o; FLASH I;" NOT IN S MODE
": PAUSE VAL "100": GO TO I
 125 CLS
 130 IF 0$(SEL,11)="ABS " OR 0$(
SEL,11)="S" THEN LOAD /0$(SEL)AB
S
 140 LOAD /0$(SEL)
```

Note in the listing that the REM must be deleted before DIM 0$ in line 20 to initiate the routine. The entire DIM statement may then be deleted to conserve memory and to prevent erasure of file names in use. The definition of 1 and 0 as one and zero, respectively, and the use of VAL "n" for most numbers conserves bytes to fit the routine into the JLO file 0 or or to insert it as a subroutine in a main program. As given, it deals only with ordinary program saves and loads, and with ABS (2068 state) or S (SPECTRUM state) saves and loads with the JLO system, but can easily be adapted to other modes and systems.

In utility programs such a ProFile, Mscript, and Tasword, it is more time and memory-efficient to be able to review a display of titles and access the data files without losing the main program each time the menu is called up. In order to make room for this menu-selector routine within the main program it will be necessary to edit the printed prompts, using token-words wherever possible. The original version of ProFile also requires some changes to allow saving and loading only the file bytes rather than the entire program, which we will discuss later.

In Tasword the tape prompts can be greatly shortened or deleted altogether if no longer needed after you have moved all your old tape files to disk. For example, if you wish to save a state version of the main program, lines 11 and 15 can be deleted and line 700 replaced by SAVE /"tasword" ABS : GO TO VAL "20" in the JLO syntax. Lines 710-790 may then also be deleted.

Note that in order to preserve the menu array if a non-state save and load of Tasword is being used, the CLEAR VAL "33279" in line 15 must be removed and placed in a short header routine. This routine may then be saved as "TASheader" LINE 1 and contains only the statements CLEAR 33279: LOAD /"tasword" in the JLO syntax. If you will be storing more than 36 data files on a disk, this header could also include an input line for loading other saves of Tasword that have been done as "tasword1", "tasword2", etc. Other changes should be made as shown in LISTING 2.

Listing 2.

```
 640 IF b=VAL "106" THEN LET a=U
SR VAL "59081": LET a=VAL "0": G
O TO VAL "9700"
1030 FOR i=SGN PI TO VAL "36": I
F 0$(i,SGN PI)=" " THEN LET 0$(i
)=a$: GO TO VAL "1050"
1040 NEXT i
1045 PRINT FLASH SGN PI;"MENU FU
LL": STOP
1050 LET i=VAL "12": GO SUB VAL
"800": SAVE /a$CODE b,a: CLS : G
O TO VAL "20"
```

To conserve memory, after entering LISTING 3 key DIM 0$(36,10) as a direct command to initiate the routine and do not use RUN to re-start at any time. Then whenever a data save is made the new title will automatically be added to the selector routine. After each work session when a re-save of the Tasword

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program is made, it will also include the up-dated menu selector. If you wish to review the file titles from the main Tasword menu, insert "READ files - f" in one of the menu printout lines and add as line 88 IF a$="f" THEN GO TO VAL "9700". Keying a capital "C" from the file display options will then return to the main menu. Revision or manual addition of new file titles may be done by keying "A" or "B", respectively, in the selector routine. Key in a null string (ENTER only) to erase an unwanted title from the menu file.

Listing 3.

```
9700 REM DIM O$(36,10)    Delete
after initialization
9730 CLS : LET I=SGN PI: LET o=N
OT PI
9735 FOR j=I TO VAL "36"
9740 PRINT AT j-I-18*(j>18),16*(
j>18);CHR$ (j+47+39*(j>10));"="
O$(j)
9750 NEXT j
9755 PRINT AT VAL "20",o; FLAS-
I;" Key C to leave file MENU "
FLASH o," T FOR NEXT tape DATA "
9760 PRINT #o;AT o,o;"KEY:     0-
1 OR a-z TO LOAD       A TO CHANG
E NAME   B TO ADD FILE": PAUSE o
: PRINT #o;AT o,o,,,,
9765 IF INKEY$="T" THEN LOAD ""C
ODE : GO TO I
9770 LET SEL=CODE INKEY$-47-39*(
CODE INKEY$>57)
9780 IF SEL=VAL "-19" THEN GO TO
 VAL "20"
9790 IF SEL=VAL "-20" THEN FOR j
=I TO VAL "36": IF O$(j,I)=" " T
HEN INPUT "New filename",O$(j):
GO TO VAL "20"
9800 NEXT j
9810 IF SEL=VAL "-21" THEN PRINT
 #o;AT o,o;"ITEM TO CHANGE",,,,
 PAUSE o: LET SEL=CODE INKEY$-47
-39*(CODE INKEY$>57): INPUT (O$(
SEL));" Old name)", LINE O$(SEL)
: GO TO VAL "20"
9830 LOAD /O$(SEL)CODE : GO TO I
```

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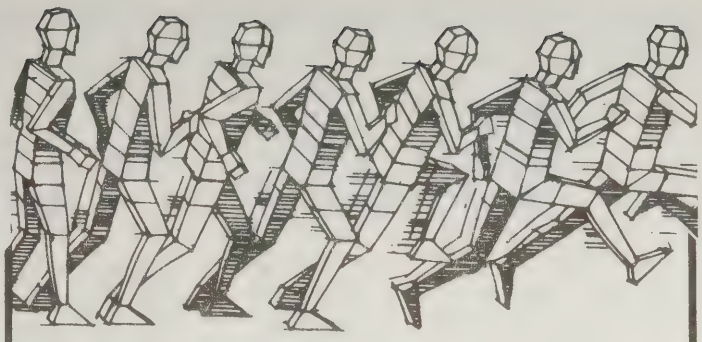

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Bob Slaughter

CTM Writer & BBS Operator

Bob Slaughter first joined the SouthTrust team in April 1980 as an officer in charge of loan servicing at the mortgage company, then known as The Jackson Company. He later transferred to the Data Center to assist in the installation of the Data-Link Mortgage Banking System. He has worked with the Data Center since that time. And is currently serving a programmer/analyst supporting the Mortgage Banking and Commercial Loan Systems.

Last year, Bob headed a team to install a new release of the Mortgage Loan System. This was a very sizable project working with an on-line, real-time system. Despite some unusual difficulties that were encontered, the project was finished on time and under budget. The installed product had the highest level of user satisfaction of any previous releases. Because of his leadership and the outstanding performance of his team, they were awarded the OUTSTANDING TEAM AWARD from SouthTrust Data Services. Bob was awarded the **Distinguished Data Processor Award** for 1986.

Bob's expertise in the application area have proven a distinct advantage in his areas of responsibility. He has willingly and freely shared his knowledge with his associates when they needed his help.

Not only has Bob work been at the exemplary level of performance in his day to day work, but he has taken on the responsibility of leading the SouthTrust Explorer Post, working with senior high school young people who have expressed an interest in data processing as a career path. He has been working with the Explorers for the past three years. His goal is to give the young men some "hand on experience" in the data processing by teaching them programming skills in Basic,

dBase, and Easytrieve. He initiated a program called "*A Day on the Job*" and secured approval from the Birmingham Board of Education to take his Explorers out of school for a day to work along side a programmer or computer operator in the "*real world*" environment. Due to his efforts in this area, SouthTrust was awarded a Plaque of Special Recognition from the Boy Scouts of America.

In his spare time, Bob works with the Downtown Jimmie Hale Mission. He has developed a PC based financial, mailing and tracking system to automate the financial and paper work of the mission, thus freeing up valuable time for the staff to take care of the more important needs, such as soul winning and ministering to those who are down and in need. The mailing system resulted in a significant financial savings for the mission in preparing their monthly mailings.

As you know, Bob allows our writers to use his BBS system to upload articles for **CTM.** Thanks Bob, for you assistance in providing this service not only to me but to the writers also. It is nice to be able to call you one of the **CTM Family.** Thanks again and God Bless you and your fine family. . .

Bob's BBS
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By P.C. Cothran

Ohm's Law

Ohms Law is one of the first significant areas studied by students in Electricity, Electronics, or physics. It comprises a break through and was formulated by a giant in the field of physics, the German scientist "OHM", whose name is associated with these primary considerations.

The program written to demonstrate Mr. Ohms' Law, entitled "OHMSLAW.BAS", in MBASIC, can be run directly on MS-DOS computers in GWBASIC, and a report will be made later on BASICA.

This program is broken into eleven segments, each segment a stand-alone entity, with due regard for initializing variables and useful string expressions. The program menu is reproduced here:

"Select the problem area

1. Ohms Law";A$
2. Ohms Law";B$
3. Resistors in Parallel, both values known";A$
4. Resistors in Parallel, both values known";B$
5. Resistors in Parallel, R(T) and one value known";A$
6. Resistors in Parallel, R(T) and one value known";B$
7. Series resistors";A$
8. Series resistors";B$
9. Power dissipation in DC circuits";A$
10. Power dissipation in DC circuits";B$
11. Voltage dividers, sample."

with A$ standing for "Explanation", and B$ standing for "Application". You will note that no string suffix is given to choice number eleven, as it is a sample "for information only".

I am still learning to use the "ON Y" expression. It was tried here, but so used it was difficult, easy to make a mistake. Therefore I retreated to the older, tried and true method used. The first of this series used the expression "Any key to resume program", but a friend critiqued my work, didn't like it, so I went to "Any key for next frame". To split such a program into "frames" makes sense, at least in a limited way.

There is some tricky logic in solving choice #2, Ohms Law Application. It can be defeated by inserting more than one ZERO at the prompt for voltage, current, and resistance, although the prompts are clear to me. IF-fy statements always give me trouble, this one is no exception. Moral: "don't fix it if it aint broke".

Working out voltage dividers on a non-graphic Kaypro II was a problem that I puzzled on for some months. The solution, as offered, is an adaptation of a masterful program written by a Mr. Schrabal some years ago in one or another dialect of BASIC. The reason for Mr. Schrabal's program appeared to be graduate school work, but this could be a mistaken assumption. Wish I could correspond with him, if only to thank him for doing excellent work.

Questions and suggestions are welcomed. Please don't get into my pocket by failing to enclose a self addressed, stamped envelope, although I will respond either through the letters to the editor section or directly, perhaps both.

Enjoy! Program follows on following page.

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```
10 ' RESISTORS, OHMS LAW
20 ' HISTORICAL AND RELEASE DATA MOVED TO END, THIS PGM.
30 LET K=0:X=0
40 LET A$=" Explanation":LET B$=" Application"
50 LET Z$=" Any key for next frame."
60 LET CL$=CHR$(26) ' clear screen in MBASIC/Kaypro
70 PRINT CL$
80 PRINT"Select the problem area "
90 PRINT
100 PRINT"1. Ohms Law";A$
110 PRINT"2. Ohms Law";B$
120 PRINT"3. Resistors in Parallel, both values known";A$
130 PRINT"4. Resistors in Parallel, both values known";B$
140 PRINT"5. Resistors in Parallel, R(T) and one value known";A$
150 PRINT"6. Resistors in Parallel, R(T) and one value known";B$
160 PRINT"7. Series resistors";A$
170 PRINT"8. Series resistors";B$
180 PRINT"9. Power dissipation in DC circuits";A$
190 PRINT"10. Power dissipation in DC circuits";B$
200 PRINT"11. Voltage dividers, sample."
210 INPUT Y
220 IF Y=1 THEN GOTO 370
230 IF Y=2 THEN GOTO 560
240 IF Y=3 THEN GOTO 950
250 IF Y=4 THEN GOTO 1150
260 IF Y=5 THEN GOTO 1390
270 IF Y=6 THEN GOTO 1600
280 IF Y=7 THEN GOTO 1840
290 IF Y=8 THEN GOTO 1940
300 IF Y=9 THEN GOTO 2180
310 IF Y=10 THEN GOTO 2290
320 IF Y=11 THEN GOTO 2640
330 IF Y<1 OR Y>11 THEN PRINT"Please choose a number between 1 and 11"
340 IF Y<0 OR Y>11 THEN FOR Q=1 TO 1000:NEXT Q
350 IF Y<1 OR Y>11 THEN RUN
360 ON Y GOTO 370,560,950,1150,1390,1600,1840,2180,2290,2640
370 ' OHMS' LAW, EXPLANATION
380 PRINT CL$:LET K=1
390 PRINT"Ohm's Law states that current varies directly with applied ";
400 PRINT"voltage and inversely with circuit resistance."
410 PRINT
420 PRINT"Another way of expessing this relationship is "
430 PRINT
440 PRINT TAB(10)"   I = E/R"
450 PRINT
460 PRINT TAB(5)"In which"
470 PRINT
480 PRINT TAB(5)"I = current in amperes"
490 PRINT TAB(5)"E = applied voltage"
500 PRINT TAB(5)"R = circuit resistance"
510 PRINT
520 PRINT"Give me any two of these values, I will give you the third."
530 PRINT
540 PRINT Z$
550 LET J$=INKEY$:IF LEN(J$)=0 THEN 550
560 ' OHMS LAW -  Application
570 PRINT CL$:LET K=1
580 PRINT"Enter the values when the prompt appears. Enter ZERO (0) for ";
590 PRINT"the value you wish."
600 PRINT
610 PRINT"Voltage ?"
```


Tell them where you saw it!

```
620 INPUT E
630 IF E=0 THEN LET X=1
640 PRINT
650 PRINT"Voltage=";E;"  Current ?"
660 INPUT I
670 IF I=0 THEN LET X=2
680 PRINT
690 PRINT"Current =";I;" Resistance ?"
700 INPUT R
710 IF R=0 THEN LET X=3
720 PRINT
730 PRINT"Resistance = ";R;" Now for Solution ! "
740 IF X=1 THEN LET E=I*R
750 IF X=2 THEN LET I=E/R
760 IF X=3 THEN LET R=E/I
770 PRINT
780 IF X=1 THEN PRINT "You gave me current=";I;" and resistance=";R
790 IF X=1 THEN PRINT"This makes the applied voltage=";E;" volts."
800 IF X=2 THEN PRINT "You gave me Voltage=";E;" and resistance=";R
810 IF X=2 THEN PRINT"This makes the current=";I;" amperes."
820 IF X=3 THEN PRINT "You gave me voltage=";E;" and current=";I
830 IF X=3 THEN PRINT "This makes the resistance=";R;" ohms."
840 PRINT
850 GOSUB 2420
860 PRINT
870 PRINT"CHOICES:"
880 PRINT"1. 'RUN' THIS PROGRAM AGAIN"
890 PRINT"2. GO BACK TO MAIN MENU."
900 PRINT"3. QUIT."
910 INPUT Y
920 IF Y=1 THEN GOTO 370
930 IF Y=2 THEN RUN
940 IF Y=3 THEN GOTO 4680
950 ' RESISTORS IN PARALLEL, BOTH VALUES KNOWN, EXPLANATION
960 PRINT CL$
970 PRINT"Resistors in parallel act like pipes in parallel.  More ";
980 PRINT"capacity for flow."
990 PRINT
1000 PRINT"The formula for resistors in parallel is "
1010 PRINT
1020 PRINT TAB(10)"   1          1          1        1"
1030 PRINT TAB(10)" ----- = ----- + ----- + -----"
1040 PRINT TAB(10)" R(T)       R1         R2     R(N)"
1050 PRINT
1060 PRINT"Is is usual to use an adaptation of this "
1070 PRINT
1080 PRINT TAB(10)"  R(T) = (R1 x R2)/(R1 + R2)"
1090 PRINT
1100 PRINT"Answer the prompts, the answer is provided."
1110 PRINT
1120 PRINT Z$
1130 LET J$=INKEY$:IF LEN(J$)=0 THEN 1130
1140 PRINT CL$
1150 ' RESISTORS IN PARALLEL, BOTH VALUES KNOWN, APPLICATION
1160 PRINT"What is the value of the first resistor (R1)?"
1170 INPUT R1
1180 PRINT
1190 PRINT"First resistor is ";R1
1200 PRINT
1210 PRINT"What is the value of the second resistor (R2)?"
1220 INPUT R2
```

```
1230 PRINT
1240 PRINT"Second resistor is ";R2
1250 LET RT=(R1*R2)/(R1+R2)
1260 PRINT
1270 PRINT"With a value of ";R1;" for one resistor and ";R2;" for the other, ";
1280 PRINT" the equivalent resistance is ";RT;" ohms."
1290 PRINT
1300 PRINT"CHOICES:"
1310 PRINT"1. 'RUN' THIS PROGRAM AGAIN"
1320 PRINT"2. GO BACK TO MAIN MENU"
1330 PRINT"3. QUIT"
 1340 INPUT Y
 1350 IF Y=1 THEN GOTO 1150
 1360 IF Y=2 THEN RUN
 1370 IF Y=3 THEN GOTO 4680
 1380 PRINT
 1390 ' RESISTORS IN PARALLEL, R(T) AND ONE VALUE KNOWN, EXPLANATION
1400 PRINT CL$
1410 PRINT"Parallel resistors may be looked at as conductances (Mhos) "
1420 PRINT
1430 PRINT"The formula we looked at first can now make sense."
1440 PRINT
1450 PRINT TAB(10)"   1          1          1"
1460 PRINT TAB(10)" ----- +   -----  +  ----"
1470 PRINT TAB(10)"  R(T)      R1         R2"
1480 PRINT
1490 PRINT"This problem, known R(T) and one resistor, can best be handled "
1500 PRINT"in this way, by keeping it as 'conductance'."
1510 PRINT
1520 PRINT TAB(10)"   1          1          1"
1530 PRINT TAB(10)" ----- =  ----  -   ----"
1540 PRINT TAB(10)"  R2        R1         R(T)"
1550 PRINT
1560 PRINT
1570 PRINT Z$
1580 LET J$=INKEY$:IF LEN(J$)=0 THEN 1580
1590 PRINT CL$
1600 ' RESISTORS IN PARALLEL,  Application
1610 PRINT"Enter the value of R(T) "
1620 INPUT RT
1630 PRINT
1640 PRINT "R(T)=";RT;"   Enter the value of the known resistor "
1650 INPUT R1
1660 PRINT
1670 PRINT"R1=";R1;"   Now for solution!"
1680 LET R2=1/(1/RT-1/R1)
1690 PRINT
1700 PRINT"The resistor, as R2, required to make R(T)=";RT;
1710 PRINT"with R1=";R1;" is ";R2;" ohms."
1720 PRINT
1730 PRINT"(This answer can be cross-checked by taking option 2)."
1740 PRINT
1750 PRINT"CHOICES:"
1760 PRINT"1. 'RUN' THIS PROGRAM AGAIN"
1770 PRINT"2. GO BACK TO MAIN MENU."
1780 PRINT"3. QUIT"
790 INPUT Y
1800 IF Y=1 THEN 1600
1810 IF Y=2 THEN RUN
1820 IF Y=3 THEN GOTO 4680
1830 PRINT
```


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```
1840 ' SERIES RESISTORS, EXPLANATION
1850 LET R=0
1860 DIM X(20)
1870 LET CL$=CHR$(26):PRINT CL$
1880 PRINT"Series resistors are additive. When you get to the end of your ";
1890 PRINT"string, enter ZERO (0). The maximum limit now is (20). Change at ";
1900 PRINT"line 1860"
1910 PRINT Z$
1920 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 1920
1930 PRINT CL$
1940 ' RESISTORS IN SERIES,  Application
1950 FOR X=1 TO 20
1960 PRINT"INPUT YOUR VALUE OF RESISTOR"
1970 INPUT A
1980 PRINT"RESISTOR IS =";A
1990 LET R=R+A
2000 IF A=0 THEN GOTO 2020
2010 NEXT X
2020 PRINT
2030 PRINT"The Sum of the resistors you provided is ";R;" ohms."
2040  PRINT"At this point you have these choices:"
2050 PRINT"1. Go back to Main Menu."
2060 PRINT"2. Want to see this segment again."
2070 PRINT"3. Q U I T"
2080 INPUT Y$
2090 IF Y$="1" THEN RUN
2100 IF Y$="2" THEN RUN 1840
2110 IF Y$="3" THEN GOTO 4680
2120 PRINT"CHOICES:"
2130 PRINT"1. 'RUN' THIS PROGRAM AGAIN"
2140 PRINT"2. QUIT"
2150 INPUT Y
2160 IF Y=1 THEN 1840
2170 IF Y=2 THEN GOTO 4680
2180 ' POWER DISSIPATION IN DC CIRCUITS, EXPLNATION
2190 PRINT CL$
2200 PRINT"Power, in electrical/electronics circuits, is measured in WATTS. "
2210 PRINT
2220 PRINT"Watts is a term involving heating, power dissipation is a limit ";
2230 PRINT"that can not be exceeded without damage to components and ";
2240 PRINT"subsequent failure.  It is usual and normal to apply a safety ";
2250 PRINT"factor to this type of calculation."
2260 PRINT
2270 PRINT Z$
2280 LET J$=INKEY$:IF LEN(J$)=0 THEN 2280
2290 ' POWER DISSIPATION, DC CKTS, APPLICATION
2300 PRINT CL$
2310 PRINT:PRINT: PRINT"You can use option 1, Ohms' Law, to help."
2320 PRINT:PRINT
2330 PRINT"What is the applied voltage ?"
2340 PRINT
2350 INPUT E
2360 PRINT"Applied voltage is ";E
2370 PRINT
2380 PRINT"What is the resistor value (scientific notation OK) ?"
2390 INPUT R
2400 PRINT"Resistor value is ";R
2410 PRINT
2420 ' SUBROUTINE FOR POWER
2430 LET W=E*E/R
2440 IF W>0 AND W<.1 THEN LET RW$="1/8 watt"
```

```
2450 IF W>.1 AND W<.125 THEN LET RW$="1/w watt"
2460 IF W>.125 AND W<.25 THEN LET RW$="1/2 watt"
2470 IF W>.25 AND W<.5 THEN LET RW$="1 watt"
2480 IF W>.5 AND W<1 THEN LET RW$="2 watt"
2490 LET RW1=W*5
2500 REM LET STR$(R)=(RW1)
2510 IF W>2 THEN LET RW$=STR$(R)
2520 PRINT"Power dissipated in ";R;" resistor with ";E;" volts applied ";
2530 PRINT"is ";W;" watts. Suggest no less than ";RW$;" resistor ";
2540 PRINT"be used, with ";RW1;"watts for 5 to 1 safety factor."
2550 PRINT
2560 IF K=1 THEN RETURN
2570 PRINT"1. 'RUN' THIS PROGRAM AGAIN"
2580 PRINT"2. GO BACK TO MAIN MENU."
2590 PRINT"3. QUIT."
2600 INPUT Y
2610 IF Y=1 THEN GOTO  2290
2620 IF Y=2 THEN RUN
2630 IF Y=3 THEN GOTO 4680
2640 ' SAMPLE VOLTAGE DIVIDERS
2650 ' HISTORY AND (COPR) MOVED TO "END OF THIS PGM."/PC
2660 LET K=0:X=0
2670 LET EN$="Any key to advance to ENDING routine."
2680 LET E$="Explanation":A$="Application"
2690 PRINT CL$
2700 REM
2710 LET CL$=CHR$(26) ' clear screen in MBASIC
2720 R1=100000!:R2=47000!:R3=11000:R4=R2:R5=22500:R6=11700:E=250
2730 LET SUM=0:LET SUMA=0
2740 LET RT=R1+R2+R3:IT=E/RT:ER1=IT*R1:ER2=IT*R2:ER3=IT*R3
2750 PRINT CL$
2760 PRINT"o --> +250 vdc"
2770 PRINT"!
2780 PRINT"!  A                B                C                D"
2790 PRINT"!/                 /                /                /""
2800 PRINT"o-----xxxx-----o-----xxxx-----o-----xxxx-----o"
2810 PRINT"          R1              R2              R3        \"
2820 PRINT"                                                    GND"
2830 PRINT"In which R1=";R1;", R2=";R2;", and R3=";R3
2840 LET I1=IT*1000
2850 PRINT:PRINT"Current is common to all three, flow is ";IT;"amperes, ";"
2860 PRINT"or ";I1;" milliamperes. Voltage drops are shown below:"
2870 '
2880 PRINT:PRINT "FRAME <1>";Z$
2890 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 2890
2900 PRINT CL$
2910 PRINT:PRINT"o --> 250 vdc +"
2920 PRINT"!"
2930 PRINT"!  A                B                C                D"
2940 PRINT"!/                 /                /                /""
2950 PRINT"o-----xxxx-----o-----xxxx-----o-----xxxx-----o"
2960 PRINT"+     ";ER1;" -     +     ";ER2;"  +        ";ER3;"- \"
2970 PRINT"          R1              R2              R3        GND"
2980 PRINT
2990 PRINT"Voltage from Ground:"
3000 PRINT"D to C:";ER3;"volts dc.";TAB(40)"C to ground=";ER3
3010 PRINT"C to B:";ER2;"volts dc.";TAB(40)"B to ground=";ER3+ER2
3020 PRINT"B to A:";ER1;"volts dc.";TAB(40)"A to ground=";ER3+ER2+ER1
3030 PRINT:PRINT"More complex circuits are difficult to show on a non-graphic ";
3040 PRINT"computer screen; a three-branch circuit is shown below, with ";
3050 PRINT"solution of the circuit."
```


Tell them where you saw it!

```
3060 PRINT:PRINT "FRAME <2>";Z$
3070 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 3070
3080 PRINT CL$
3090 LET R1=100000!:R2=47000!:R3=11000!:R4=R2:R5=22500!:R6=11700!:E=250
3100 LET A$="  o----> 250 vdc +"
3110 LET B$="
3120 LET C$="  x"
3130 LET D$="  o----------o"
3140 LET E$="  o          o----------o"
3150 LET F$="  !          !"
3160 LET G$="  !          !         !"
3170 LET H$="  o          o         o"
3180 LET I$="  x          x"
3190 LET J$="  x          x         x"
3200 LET  K$="  x (R4)     x (R5)  x (R6)"
3210 LET  L$="  o----------o----------o"
3220 PRINT A$
3230 PRINT B$
3240 PRINT B$
3250 PRINT"  x (R1)";TAB(40)"In which these values apply:"
3260 PRINT C$
3270 PRINT B$
3280 PRINT D$;" A";TAB(40)"R2=";R2
3290 PRINT F$;TAB(40)"R3=";R3
3300 PRINT F$;"F$";TAB(40)"R4=";R4
3310 PRINT I$;TAB(40)"R5=";R5
3320 PRINT"  x (R2)     x (R3)";TAB(40)"R6=";R6
3330 PRINT F$
3340 PRINT E$ ;" B";TAB(40)"SOLUTION IN NEXT FRAME."
3350 PRINT G$
3360 PRINT J$
3370 PRINT K$
3380 PRINT J$
3390 PRINT G$
3400 PRINT L$
3410 PRINT"                    \"
3420 PRINT"                     GND"
3430 PRINT "FRAME <3>";Z$
3440 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 3440
3450 PRINT CL$
3460 LET RA=(R5*R6)/(R5+R6)
3470 LET RB=RA+R3
3480 LET RC=R2+R4
3490 LET RP=(RC*RB)/(RC+RB)
3500 LET RT=RP+R1
3510 LET IT=E/RT:LET POWER=(IT^2)*RT
3520 LET EA=(E-(IT*R1))
3530 LET IC=EA/RC
3540 LET IB=EA/RB
3550 LET EB=(EA-(IB*R3))
3560 LET IR5=EB/R5:LET SUMA=SUMA+IR5
3570 LET IR6=EB/R6:LET SUMA=SUMA+IR6
3580 LET IR3=(IR6+IR5)
3590 LET IR4=IC:LET SUMA=SUMA+IR4
3600 LET DIFF=SUMA-IT
3610 LET IR2=IC
3620 LET IR1=IT
3630 LET PR6=(IR6^2)*R6:LET SUM=SUM+PR6
3640 LET PR5=(IR5^2)*R5:LET SUM=SUM+PR5
3650 LET PR4=(IC^2)*R4:LET SUM=SUM+PR4
3660 LET PR3=(IB^2)*R3:LET SUM=SUM+PR3
```


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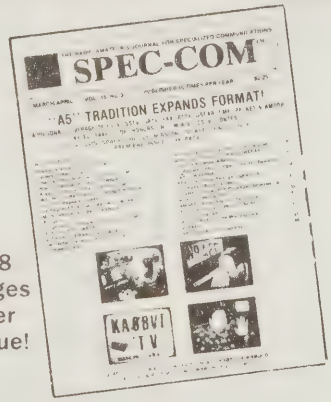

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3670 LET PR2=(IC^2)*R2:LET SUM=SUM+PR2
3680 LET PR1=(IT^2)*R1:LET SUM=SUM+PR1
3690 PRINT A$
3700 PRINT B$
3710 PRINT B$
3720 PRINT"  x (R1)";TAB(32)"R5 and R6 become ";RA;"ohms."
3730 PRINT C$;TAB(32)"in series with R3, or ";RB;"ohms."
3740 PRINT B$
3750 PRINT D$;" A";TAB(32)"This (right branch) ";RP;"ohms, is in "
3760 PRINT F$;TAB(32)"parallel with the left branch, ";R2+R4
3770 PRINT F$;TAB(32)"ohms. Equivalent is ";RP;"ohms."
3780 PRINT I$
3790 PRINT"  x (R2)     x (R3)";TAB(32)"All in series with R1,";R1
3800 PRINT F$;TAB(32)"for a total resistance of ";RT;"ohms."
3810 PRINT E$ ;" B";TAB(32)"As seen by the power supply, ";E;"volts."
3820 PRINT G$
3830 PRINT J$
3840 PRINT K$;TAB(35)"Equations in next frame."
3850 PRINT J$
3860 PRINT G$
3870 PRINT L$
3880 PRINT"                    \"
3890 PRINT"                     GND"
3900 PRINT
3910 PRINT "FRAME <4>";Z$
3920 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 3920
3930 PRINT CL$
3940 PRINT"The parallel pair, R5 and R6, apply (R5 x R6)/(R5 + R6)=";RA
3950 PRINT"This equivalent is in series with R3, ";R3;"ohms, for an ";
3960 PRINT"equivalent resistance of ";RB;"ohms. Let's call this one 'RC'.""
3970 PRINT
3980 PRINT"R2 and R4 are in series, and give the equivalent of ";R2+R4;
3990 PRINT"ohms.  Let's call this one 'RD', for simplicity in the next line.
4000 PRINT
4010 PRINT"The series pair, R2 and R4 are now ";RC;" the parallel (right) ";
4020 PRINT"branch is ";RB;"ohms, with appropriate labels of 'RB' and 'RC'."
4030 PRINT
4040 PRINT"We can apply the equation: (RB x RC)/(RB + RC)=";RP;"ohms."
4050 PRINT
4060 PRINT"This resistance, ";RP;"ohms, is in series with R1, ";R1;"ohms for ";
4070 PRINT"a total of ";RT;"ohms across the power supply, ";E;" volts dc."
4080 PRINT
4090 PRINT"The resistance (RT) will permit ";IT;
4100 PRINT"amperes to flow in the circuit."
4110 PRINT
4120 PRINT"Tabulated end results are in the next frame."
4130 PRINT
4140 PRINT "FRAME <5>";Z$
4150 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 4150
4160 PRINT CL$
4170 PRINT"IT=";IT;"amperes":PRINT"I(R1)="IT;"amperes.":PRINT"Power
(R1)=";PR1;"watts."
4180 PRINT"Voltage drop across R1=";ER1;"volts, subtracted from ";E;"volts=";EA;"volts dc."
4190 PRINT"This voltage is across the rest of the circuit, and can be ";
4200 PRINT"used in calculations, as follows:"
4210 PRINT:PRINT"Current in the left branch = ";IC;"amperes, from (EA/(R2+R4)."
4220 PRINT:PRINT"Power dissipated will then equal ";PR2;"watts and ";PR4;"watts,
respectively."
4230 PRINT:PRINT"The same voltage is across the right branch, ";RB;"ohms, causing a current
flow of ";
4240 PRINT IB;"amperes through it."
```


Tell them where you saw it!

```
4250 PRINT:PRINT"Therefore, R3 drops ";ER3;"volts, making the voltage ";
4260 PRINT"at point B=";EB;"volts dc."
4270 PRINT
4280 PRINT "FRAME <6>";Z$
4290 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 4290
4300 PRINT CL$
4310 PRINT"With a voltage of ";EB;"the resistors R5 and R6 will draw ";
4320 PRINT IR5;"amperes and ";IR6;"amperes, respectively."
4330 PRINT TAB(5);:PRINT TAB(5);"Voltage drops and power dissipation tabulated below:"
4340 PRINT TAB(5);"Current, R5=";IR5;"amperes, voltage R5=";EB
4350 PRINT TAB(5);"Current, R6=";IR6;"amperes, voltage R6="EB
4360 PRINT TAB(5);"Power, R5=";PR5;"watts."
4370 PRINT TAB(5);"Power, R6=";PR6;"watts."
4380 PRINT TAB(5);"Power, R3=";PR3;"watts."
4390 PRINT TAB(5);"Power, R2=";PR2;"watts."
4400 PRINT TAB(5);"Power, R4=";PR4;"watts."
4410 PRINT TAB(5);"Power, R1=";PR1;"watts."
4420 PRINT TAB(5)"Sum power=";SUM;"watts."
4430 PRINT:PRINT"One method of checking results is by SUMMING, then ";
4440 PRINT"perfoming a subtract from a calculated (true) value.";
4450 PRINT"If the results are 'infintesimal' (less than a millionth), the ";
4460 PRINT"calculation is 'validated'. Here are your results:"
4470 PRINT:PRINT"SUM of power =";SUM;"watts, less calculated power=";POWER-
SUM;"watts."
4480 PRINT"SUM of current =";SUMA;"amperes, less calculated current of ";IT;
4490 PRINT"=";DIFF;"amperes."
4500 PRINT
4510 PRINT "This is the last frame (FRAME <7>. ";Z$
4520 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 4520
4530 PRINT CL$
4540 PRINT EN$
4550 LET JJ$=INKEY$:IF LEN(JJ$)=0 THEN 4550
4560 GOTO 4570
4570 PRINT CL$
4580 PRINT
4590 PRINT"AT THIS POINT YOU HAVE AT LEAST THREE CHOICES:"
4600 PRINT"1. Go back to Main Menu."
4610 PRINT"2. Want to see the DIVIDERS frames again."
4620 PRINT"3. Q U I T"
4630 INPUT Y$
4640 IF Y$="1" THEN RUN
4650 IF Y$="2" THEN 2700
4660 IF Y$="3" THEN GOTO 4680
4670 END
4680 ' ************************************************************
4690 ' * THIS PROGRAM STARTED 6/19/84, OHMSLAW PORTION COMPLETED ON OR *
4700 ' * ABOUT 4/15/85. DIVIDER PORTION FINISHED 11/1/86.(COPR) 11/1/86*
4710 ' * PUB RIGHTS ASSIGNED TO CTM MAGAZINE, 1704 SAM DRIVE,        *
4720 ' * BIRINGHAM, AL FOR PUBLICATION BY CHET LAMBERT, (205) 854-0271.*
4730 ' * ALL OTHER RIGHTS RETAINED. P.C. COTHRAN, 3905 TELSTAR CIRCLE, *
4740 ' * HUNTSVILLE, AL. 35805-5622  ENJOY!                    *
4750 ' ************************************************************
4760 ' SAVE SUBROUTINE
4770 PRINT TAB(25)"Saving 'OHMSLAW.BAS"'
4780 SAVE "OHMSLAW",A
**********************************
4760 ' SAVE SUBROUTINE
```

Enjoy!

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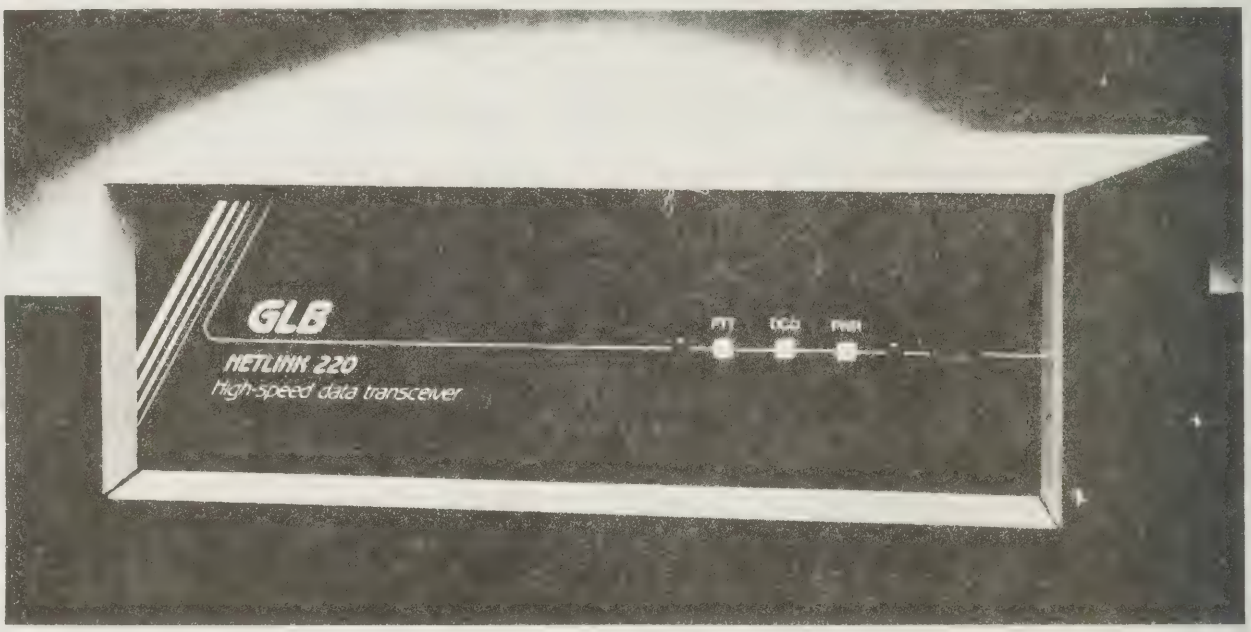

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- Turnaround: 3 ms both ways
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By Steven Hanselman, KC4SW

A Review

ICOM µ2AT 2mtr Hand Held

A BIG radio in a small package

This month we're going to look at the ICOM IC-µ2AT, ICOM's new extremely small 2 meter handie-talkie. As per their usual operation ICOM has dropped a very nice bombshell among the other small size radios. For users of the IC-2AT (or it's brothers) this radio will fall right into place in your shack. This compact package gives you the flexibility of a 1.5 (2.5 big battery) watt 2 meter radio along with the ability to monitor the public safety band. The receiver can cover 130 to 170 MHz, while the transmitter is limited to 144 to 148 MHz.

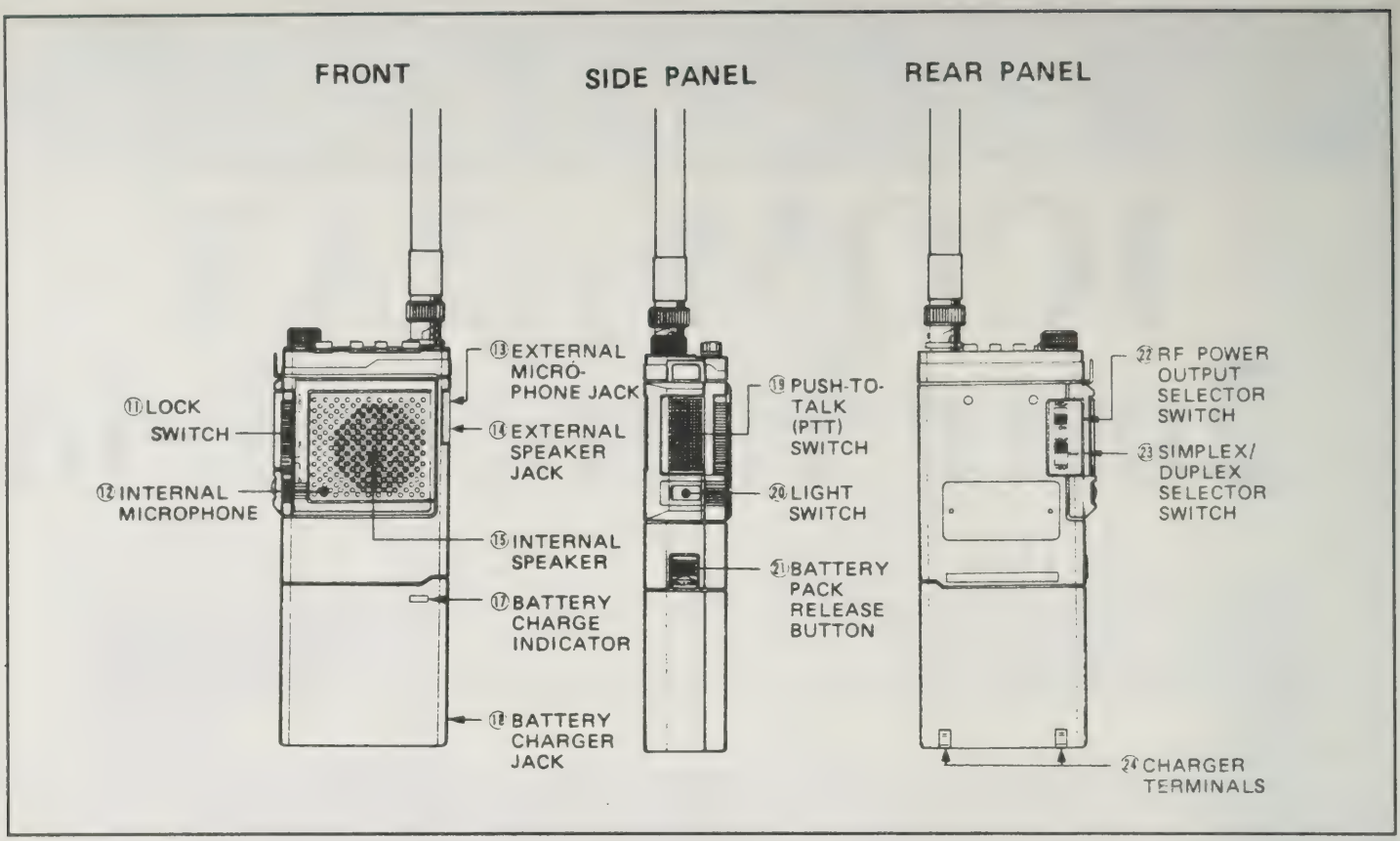
How Does It Look??

The radio is very compact without the battery it's only 3 inches tall by 2 1/4 inches wide and 1 1/4 inches deep (of course this is also without the antenna). I'll cover the batteries later on in the accessories section. Overall the layout of the unit is quite nice. There is a liquid crystal display for "band" (I'll get to this later), memory channel, operating frequency, and S/RF out meter. Since the real estate on this radio is very expensive ICOM played some games with the controls. The volume control is a large (well sort of) 1/2 inch diameter, while the squelch control

ICOM µ2AT

is only about a 1/4 inch diameter. This is a great idea as in normal operation the squelch is almost never used and you're always diddling with the volume. Frequency is set by using a small rocker switch for each position i.e. MHz, 100 KHz, 10 KHz. Pushing it one way moves the radio up a notch and pushing it the other moves it down a notch. These switches may be either toggled for a single step or held which allows the display to auto-step till the switch is released. There is also a rocker switch for changing the memory channel. The remaining two switches on the top of the unit are the **"tone"** which turns on the sub-audible tone, and the **"check"** switch which will let you listen on the selected transmit frequency. The last tidbit on the top of the radio is the transmit LED which glows red in transmit (funny about that) in addition the lamp will not glow if the battery is too exhausted to operate the radio.

The front of the radio (on the IC-µ2AT) has the 16 button DTMF pad. The pad has, as could be expected, has very small buttons. They are tough for a gorilla like me to use but they have a very nice "feel" and with care are pretty easy to use. There is also a **"F.LOCK"** slide switch, this will lock the transceiver on what ever frequency that you have set in the display at that time. The PTT switch is on the same side as the **"F.LOCK"** along with the dial light switch, which is a push on - push off type of switch. The great part about this is that the dial light is a REAL light, the display can be read easily in any light level!! The back of the radio has the **HI-LO** power slide switch and the **OFFSET** switch (+,simplex,-). The last point to make is that the radio has a power saver circuit that goes to work automatically if there hasn't been any activity on the channel or any switch operation for 30 seconds.



If this is the case then the radio falls into a standby mode using a bit less than 1/4 the normal stand-by operating current.

Putting the IC-μ2AT on the A

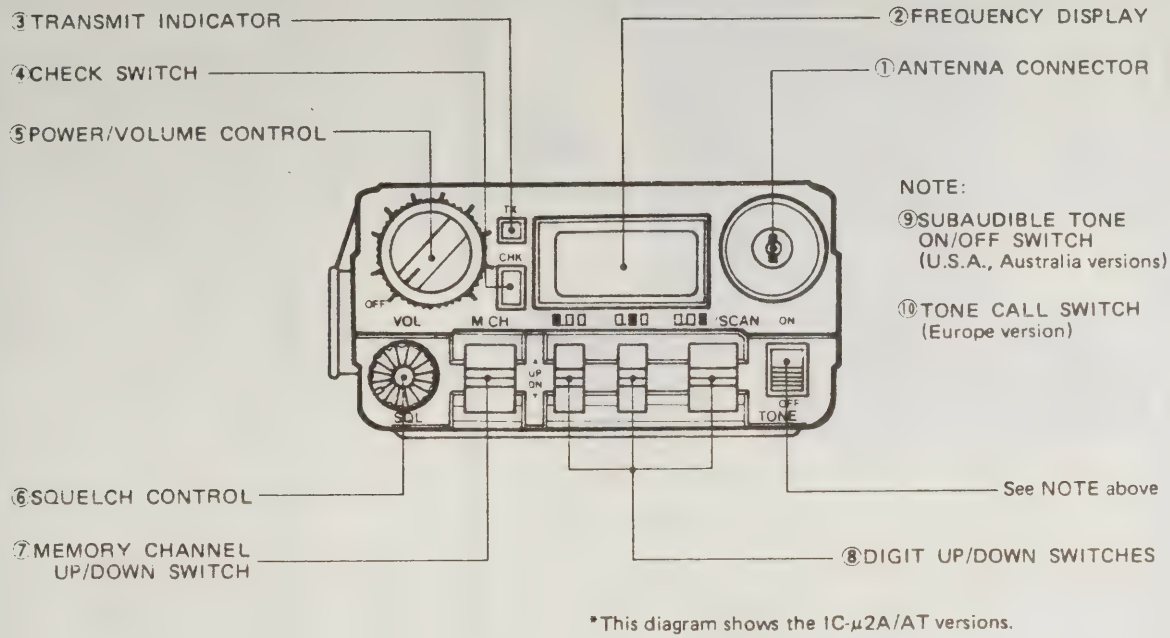
Getting the μ2AT on the air is very quick and easy, just turn it on and flip a couple of switches and you're there. Seriously, getting the μ2AT on the air is quite easy. After turning on the unit the display will show a frequency of 5.00, just to the left of this is a dot (series of dots). These dots are the **"Band"** display I talked about earlier. Each dot indicates a 10 MHz segment with no dots equaling 130 MHz and 4 dots equaling 170 MHz. The default frequency on power up is 145.00 MHz. A quick mention about memories will be needed here. This radio does not have memories in the sense that we normally think of them. They will only hold the RECEIVE frequency. The transmit frequency and sub-audible tone are selected by switches on the radio. This means that operating repeaters with odd splits will be a difficult project. In order to operate using a different offset you must select one of the two offset "+" or "-", push and hold the dial light button, and then turn the radio on. The display will show the current offset this can now be changed to whatever you want up to 39.95 MHz. To complete the programming you only have to press the PTT button. While the offset range seems (and it is) very large the radio will not allow you to operate outside of the band. You also want to remember that this is now the offset used in all modes until it is reset. In addition there is no "memory write" mode on the radio. When you set a frequency into the display that frequency is put in the memory channel that was selected. There is not a "5 KHz" switch as the "10's"

ICOM offers 4 NI-CAD battery packs ranging from a small 7 volt, 120 mAH to a 10.8 volt 600 mAH. They also offer a pack that will take 6 "AA" size NI-CADS or Alkaline batteries. Please check out the chart for a comparison of the different batteries.

	BP-21	BP-22	BP-23	BP-24
terminal voltage	7.2	8.4	8.4	10.8
height (inches)	1.25	2.5	2.75	3.5
power output (watts)	1.2	1.6	1.6	2.6
operating time (hours)	2.	4.5	10.	8.

ICOM Battery Information

Tell them where you saw it!



switch actually moves the radio in 5 KHz increments. The radio only allows one subaudible tone at a time with the programming switches located on the bottom of the radio where the battery slides on. There is a fairly clear chart in the manual of how to set the tone frequency. The tones are turned on by using the TONE switch on the top of the radio or by setting one of the slide switches (on the bottom of the radio) to the on position. This way if your favorite repeater requires tone all of the time it will always be turned on. ICOM seems to have traded off the "bells and whistles" for a compact easy to get going radio.

Batteries and Optional Goodies

ICOM offers 4 NI-CAD battery packs ranging from a small 7 volt, 120 mAH to a 10.8 volt 600 mAH. They also offer a pack that will take 6 "AA" size NI-CADS or Alkaline batteries. Please check out the chart for a comparison of the different batteries.

The operating times are spec'ed for 10% transmit, 10% receive, 80% standby. I found that the standard BP-22 worked vary well during testing but I think that If I owned one of these radios I would probably get the BP-23 for the additional capacity. I also found that when the battery went down it gave no warning, it just quit. All of the batteries may be charged in 1 hour in the BC-50 desk charger or in 15 hours using either the CP1 (cigarette lighter plug) or the appropriate plug-in the wall charger. The last neat gadget is an adapter that allows you to use your existing IC-2AT (or brothers) desk charger. This unfortunately will only charge the battery at the slow (15 hour) rate but it will cut down on expensive desk chargers. There is a DC to DC converter which slides onto the radio in place of a battery and converts 13.8 volts to 9.4 volts for operating the radio. According to the little sheet that comes with the radio outlining the accessories it would seem that the standard IC-2AT headsets and handmikes should work with this unit. I didn't have any of these goodies to check this out. While the IC-μ2AT comes standard with a subaudible tone encoder there is also the UT-37 sub-audible decoder. There are also UT-38 DTMF and UT-39 tone encoder for the μ2A These appear to allow you to upgrade the μ2A to a μ2AT. These last 3 goodies are "internal accessories" this seems strange in the light of ICOMs admonishment *"DO NOT disassemble the transceiver as it may cause trouble"*. These accessories were not sent with the unit so I'm not sure how easy/hard they are to install in the radio.

Documentation

The manual provided was up to ICOMs normal level of expertise. ICOM uses the picture/description method of teaching which makes it quite clear. There were two places I felt the book let me down. The first was dealing with the subaudible tone encode while the chart is quite clear as to where the switches should be set (0/1) they do not explain which is which does 0 = off or on. The assumption is that 1 = on, however I have found some pieces of equipment where 0 = on. The other is the lack of internal parts placement drawings ICOM caut-

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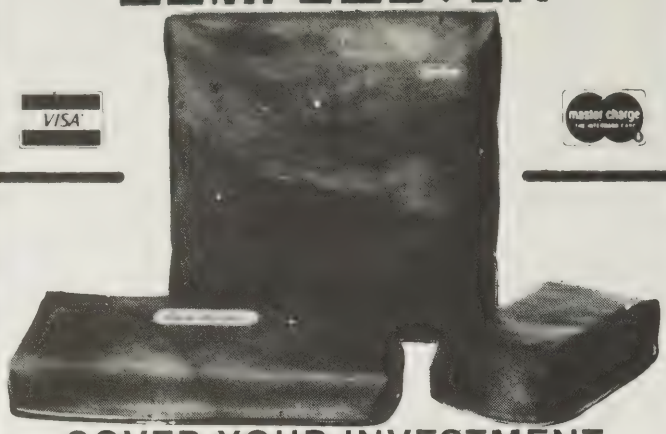

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ions you not to open the unit but does provide a detailed block diagram and a good schematic diagram. The problem comes when trying to tie the diagrams to the radio.

Overall View of the µ2AT

I can say this is one of the best of the "micro" handie-talkies around. It seems the manufacturers are beginning to put out equipment that is what **WE** *need* as opposed to what **THEY** think we *need*. The radios are also beginning to show a bit more attention to detail and durability than they used to. ICOM has done all of these things with the IC-µ2AT (I suspect that it's brothers are the same) they have provided us with a simple to set-up and operate little radio that fits the small "shirt pocket" easy-to-handle niche. For those of you who have to keep the **XYL** happy before she'll let you get that new linear take a look at IC-µ2AT. This radio will drop right into a purse and not take up to much room.

Stephen Hanselman, KC4SW
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QZX

The Journal Covering Amateur Radio & Sinclair Computers ZX-80, Micro-Ace, ZX81, T/S 1000, 1500, & 2068

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A monthly magazine sent by first class mail to radio amateurs or others interested in the application of Timex or Sinclair computers to communications. Contains programs, hardware articles, and operating hints. Sample issue for a self-addressed envelope with 39 cents. U.S. subscription $12.00 per year to the above address.

Tell them where you saw it!

By Jim Hale, AsO

Amateur Satellite Observers

Some of you have asked for a list of the brightest satellites for visual observation. I will do better than that. I will list some bright satellite here and now as well as the brightest targets in the North American obsdrving window each month. The Mir complex is the brightest satellite except the Moon itself. Mir will get brighter as it's added on to this year. Perhaps bright enough to cast its own shadow? After Mir comes the Salyut 7 station. Just slightly dimmer are the Cosmos Ocean spy satellite. They are always in 65.0 deg./93. minute orbits, are maneuverable, and first magnitude. The new 12x4 final stage left in orbit by Cosmos 1697 type Electronic spy satellite make bright objects for observers. At least first magnitude.

From the U.S.A. there are several. The Apollo 4 shroud 65.39B is a left over from the old Pegasus satellite, and can shine @ first magnitude. Also at first magnitude are Centaur rockets 63.47A, and 72.65B. The Seasat 1 78.64A is an Agena stage with payload attached and several large solar panels. It can also reach first magnitude, and sometimes brighter in a flash. The IRAS astronomy sat is dimmer than the others but worth mentioning @ second to third magnitude.

In July we have some of these and more. The Aureola 1 rocket 71.119B is a Soviet 7.4x2.4 meter stage, in an eccentric orbit 403 x 2157 km. At perigee it may reach second magnitude but a dim 6.5 at apogee. The Aureole 3 rocket will be here after mid-month. About the same time look for Cosmos 206. It's a 5x1.5 Meteor prototype with two large solar panels. It can reach second magnitude. Cosmos 118 is like 206 but comes around at the end of the month.

At the very end of July comes Cosmos 1400. The satellite that's said to be the "Perseus Flasher". I will be watching to see if it flashes like a gamma-ray burster. It's shaped like 206 and 118 above. Let me know what you see. There are several Cosmos rocket stages that will reach third magnitude on a good pass. Look for them.

I am told there will be a launch on July 22 of a Syrian Cosmonaut to Mir complex in a Soyuz transport. Looking ahead I see that Mir will be visible to me the a.m. of 23rd-26th going south to north. I let you know if I saw it next month. The last Soyuz took 48 hours to dock with Mir so we have a good chance to see the rendezvous in the U.S. if all goes well. Be watching with your camera ready.

I have been having a fine time with my scanner radio. I've listened to the following satellites at least twoce; Aryabhate 75.33A @ 137.44 MHz, NOAA 10 86.73A @ 137.5, NOAA 9 84.123A @ 137.62, Meteor 2-14 @ 137.65, Geosat 85.21A @ 150.012 MHz.

By far the most common satellite is the civilian and military navigation satellite. They are 1.3 x 1.9 meters and about 1000km altitude in 82.9 inclinations. They sound like fast code transmissions and contain signals from the following: Cosmos 1655, 1709, 1727, 1759, 1791, 1802, 1803, 1808, and 1816. If you have any frequencies, please send them to me. I was not able to copy the Mir voice transmissions. Perhaps they are only heard in the North East States. I will keep on trying anyway.

Of the satellite I mentioned last month I was able to spot only three. The PRO-14 (China) payload is said to be 2.4x2 meters. It's in a 36 degree orbit that ranges from 6568 to 479 km altitude. When I saw 84.8A it seemed to be in a slow roll and would reach 3 to 4th magnitude then fade to 6th or 7th as I watched in 7 X 50 binoculars. So if you look in the wrong part of the pathc you may miss it. The ORBIT program picks the closest approach and at that position PRC-14 was at its brightest.

The Burner 2 rocket 66.825 was very faint @ 7th magnitude or fainter. The 78.42B rocket that may be a Burner 2A rocket was a bright 4.5 magnitude and easy to the naked eye. I must keep looking

at more Burner 2A rockets!

I don't know why but one satellite I hve trouble with is the Snapshot 65.27A and its fiberglass shrouds C and D. I was only able to spot componant D but it was a fine sight slowly brightening to 4.5 magnitude then down to 7.5 magnitude. I caught two of the Soviet Cosmos Ocean spys last month. Cosmos 1646 85.30A and Cosmos 1769 86.59A. The first was 2.5 magnitude and the second was first magnitude. The Midas 5 early warning sat was the toughest object all month for me. No closer than 2700 km the 9x1.5 Agena with solar array was only 7th magnitude. But some of them will roll into an angle and rech naked eye brightness for a few seconds as it goes slowly south to north or north to south. The U.S. ITV-1 rdt is said to be 1.5x5 meters. But even though it's small when at perigee (311 km) 85.1140, an Altair rocket was up to 4th magnitude.

There will be no price increase for AsO Dataletter. I will hope for those of you that are able might pay more than 41.00 from time to time. And that sale of ORBIT software pick up. I need someone to convert Timex ORBIT 4 to IBM basic. This Sinclair version is the most advanced yet. Also available are the code changes to convert ORBIT to predict all passes day and night for those who want to monitor signals, no charge.

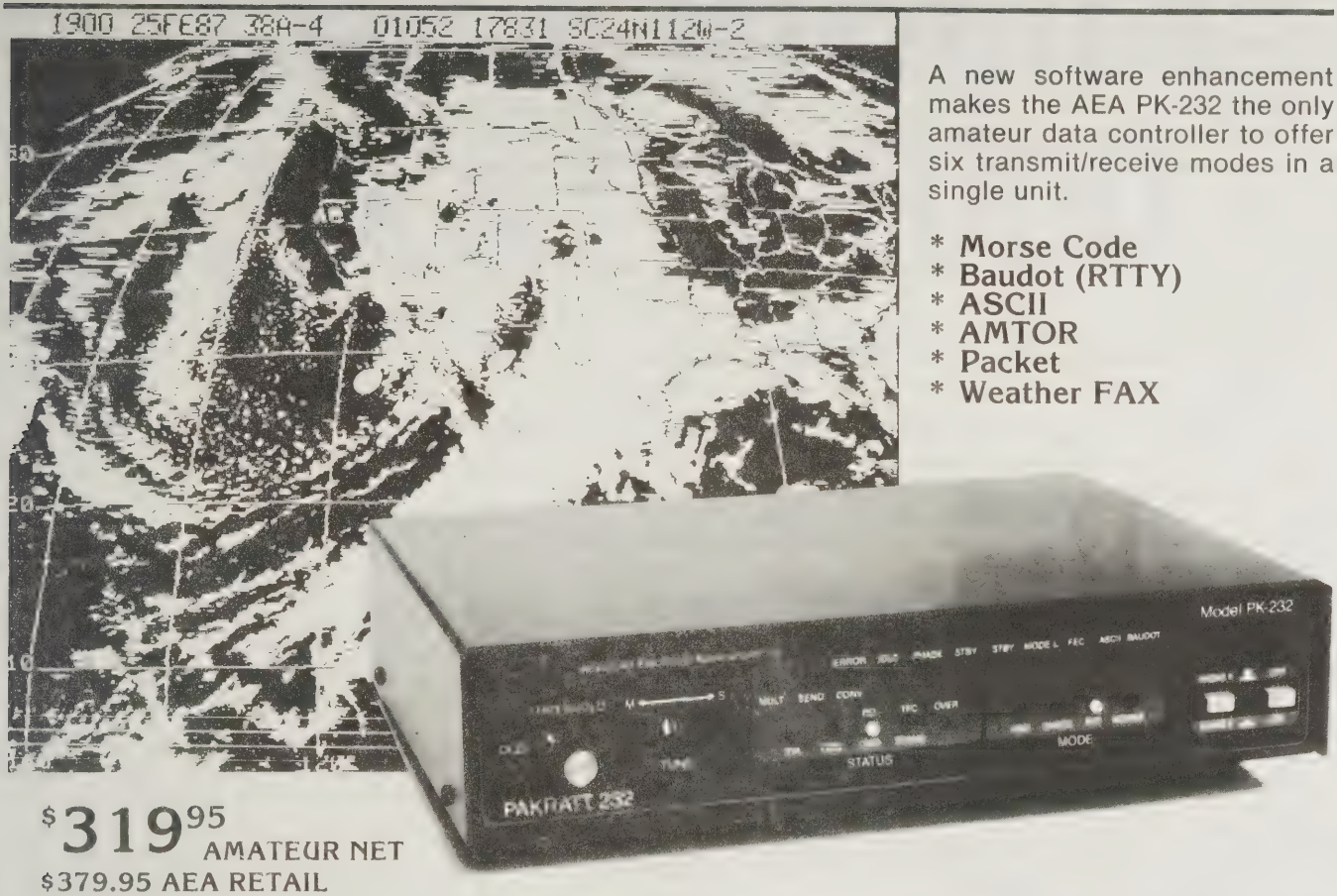
Jim Hale
HCR 65, Box 261-B
Kingston, Arkansas 72742
CTM

(------- Satellite designations -------)			Epoch	Inclination	Asc. Node	Ecc.	Perigee	M.A.	M.M.	M.M. Dot
62 BA2	Alouette 1 (Rocket)	426	159.36089	80.4655	291.2928	.0017655	136.8721	163.1861	13.67070	.00000043
63 47A	Centaur 2	694	160.63415	30.3600	344.4092	.0751116	100.2269	263.3758	13.62468	.00000539
65 14B	Cosmos 58 (Rocket)	1098	159.02773	65.0154	88.3769	.0015651	22.2064	337.9782	15.61365	.00014228
65 39B	Pegasus 2 (Rocket)	1385	158.27514	31.7443	127.9710	.0059504	56.4519	304.1808	15.36491	.00004585
66 25D	OV1-4 (Rocket)	2124	153.30540	144.5128	83.6261	.0083531	277.9607	81.1566	13.85063	.00000065
66 31A	OAO 1	2142	160.43005	35.0380	263.0503	.0009557	59.2248	300.9255	14.30165	.00000043
66 38B	Cosmos 118 (Rocket)	2169	155.28308	64.9749	102.2241	.0029419	135.7551	164.2675	15.34899	.00004212
67 18B	Cosmos 144 (Rocket)	2696	159.70606	81.1901	259.8131	.0053117	331.1983	28.6314	15.36117	.00003984
67 27B	Cosmos 151 (Rocket)	2721	160.48581	56.0508	289.0207	.0008314	36.1422	324.0177	15.55007	.00016458
67 33B	Cosmos 156 (Rocket)	2763	160.33499	81.1761	104.6286	.0060617	140.2931	220.2721	15.13241	.00001129
67 102B	Cosmos 184 (Rocket)	3011	157.46350	81.1543	297.5785	.0096346	81.4815	279.7313	15.09700	.00001039
67 104B	Cosmos 185 (Rocket)	3019	159.37215	64.0675	295.3744	.0227050	328.5429	30.2253	14.83535	.00000739
68 19B	Cosmos 206 (Rocket)	3151	159.73040	81.2100	82.4532	.0072834	186.8293	173.1865	15.07240	.00001001
68 40B	Cosmos 220 (Rocket)	3230	149.15619	74.0433	197.0467	.0050568	148.5818	211.8394	14.62550	.00000257
68 49B	Cosmos 226 (Rocket)	3283	159.55242	81.2140	248.4746	.0067693	304.2054	55.8737	15.18327	.00001535
68 110A	OAO A2	3597	158.92702	34.9964	40.4007	.0007650	307.6347	52.3433	14.39357	.00000092
68 110B	OAO-A2 (Rocket)	3598	158.54931	34.9942	263.1925	.0058161	103.3663	257.4762	14.42730	.00000148
69 29B	Meteor 1 (Rocket)	3836	157.01411	81.1643	153.1650	.0107131	309.5538	49.2112	15.32809	.00005813
70 9A	SERT-2	4327	154.21770	99.2666	45.0647	.0004953	8.3966	351.7243	13.57377	.00000031
70 34B	MAO 1 (rocket)	4392	159.23496	68.4024	77.9293	.0876738	14.6901	347.7968	13.47909	.00003547
71 83A	ASTEX	5560	159.38773	92.7253	291.3736	.0019044	305.0202	54.9143	14.37184	.00000175
72 65A	Copernicus	6153	160.16626	35.0070	77.4837	.0008293	29.3291	330.7890	14.49353	.00000122
72 65B	Copernicus (Rocket)	6155	159.82961	35.0109	347.4026	.0051068	109.2246	251.3930	14.52625	.00000136
72 76A	RADCAT	6212	157.76441	98.5343	67.8956	.0011321	127.8353	232.3873	14.59464	.00000429
72 106B	Cosmos 542 (Rocket)	6329	159.45143	81.1906	289.6113	.0026476	158.5704	201.6705	15.62436	.00016227
73 5B	Cosmos 546 (Rocket)	6351	160.29313	50.6582	224.2507	.0010861	278.1721	81.8023	15.66487	.00028000
73 107B	OREOL 2 (Rocket)	7004	157.14022	73.9992	56.1838	.0858429	274.1191	76.2374	13.63190	.00001883
75 33B	Aryabhata (Rocket)	7753	160.31047	50.6462	130.1032	.0014732	114.8225	245.4296	15.51728	.00011960
76 85B	Cosmos 851 (Rocket)	9390	157.79176	81.1663	92.8375	.0069025	307.7304	51.7569	15.09812	.00000240
77 55B	Cosmos 921 (Rocket)	10096	158.64998	75.8359	251.3075	.0053193	220.3609	138.7537	14.76099	.00000153
78 64A	Seasat 1	10967	153.05129	107.9942	193.2948	.0001599	274.2628	85.8330	14.33666	.00000176
78 67B	Cosmos 1025 (Rocket)	10974	158.08886	82.4917	51.1548	.0022908	103.8552	256.4701	14.77128	.00000133
78 113B	Cosmos 1064 (Rocket)	11162	158.35330	82.8983	98.2837	.0123973	205.0614	154.4587	15.41532	.00014850
79 11B	Cosmos 1076 (Rocket)	11267	157.71419	82.5305	73.1519	.0022985	101.6516	258.7243	14.77897	.00000136
79 20B	Intercosmos 19 (Rocket)	11286	157.11787	73.9932	56.0890	.0291543	153.9770	207.6378	14.61813	.00000806
79 51A	Bhaskar	11392	157.38801	50.6591	263.2767	.0003951	52.8559	307.2754	15.53764	.00007206
80 5B	Cosmos 1151 (Rocket)	11672	146.39072	82.5172	291.5177	.0020504	163.3001	196.3895	14.77303	.00000113
80 14B	SMM 2nd Stage	11704	157.50527	28.5088	184.7462	.0002713	32.3423	327.7290	15.35982	.00004936
81 17A	Astro 1	12307	148.34182	31.3402	153.7362	.0035789	141.3401	218.9813	15.01420	.00001034
81 95A	Cosmos 1310	12852	159.26468	65.9252	229.3761	.0010002	158.6224	201.5358	15.49530	.00006543
82 26B	Cosmos 1345 (Rocket)	13119	157.39580	74.0410	298.3189	.0023273	156.7160	203.5083	15.29268	.00003502

Tell them where you saw it!

New PK-232 Breakthrough

Six Digital Modes - Including Weather FAX



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Your home computer (or even a simple terminal) can be used for radio data communication in six different modes. Any RS-232 compatible computer or terminal can be connected directly to the PK-232, which interfaces with your transceiver. The only program needed is a simple terminal program, like those used with telephone modems, allowing the computer to be used as a data terminal. All signal processing, protocol, and decoding software is in ROM in the PK-232.

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The RS-232 connector is also used for attaching any Epson graphics compatible parallel printer for printing Weather Fax. Weather maps and satellite photos, like the one in this ad, can be printed in your shack.

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Lynnwood, WA 98036
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82 33A	Salyut 7	13138	160.81938	51.6156	250.2659	.0001557	177.4988	182.6075	15.31124	.00001971
82 121B	Cosmos 1427 (rocket)	13751	159.99084	65.8321	3.8540	.0011281	6.5754	353.6115	15.65157	.00029000
83 4A	IRAS	13777	158.38609	99.0773	353.3822	.0012912	185.6740	174.4279	13.98421	.00000054
83 101B	Cosmos 1501 (Rocket)	14381	159.57453	82.9367	356.3432	.0024901	183.1194	176.3894	15.36369	.00005681
84 7B	Cosmos 1534 (Rocket)	14669	158.99224	65.8391	351.1856	.0033565	314.3022	45.5369	15.33236	.00004223
84 53A	Cosmos 1567	15009	157.32686	65.0147	116.3725	.0019242	258.3190	101.5790	15.54197	.00026000
84 83A	Cosmos 1588	15167	160.24601	65.0244	97.2709	.0014038	258.3010	101.1604	15.58710	.00042000
84 106A	Cosmos 1603	15333	160.83174	71.0081	346.2926	.0017189	281.9059	78.0152	14.11947	.00000000
84 108B	ERBS	15354	158.18388	56.9982	184.0231	.0008590	131.3564	228.8132	14.88316	.00000101
84 127B	Cosmos 1615 (Rocket)	15448	157.73930	65.8237	275.1345	.0041590	163.6506	196.5966	15.37738	.00005812
85 89A	Cosmos 1688	16107	159.40006	50.6701	232.6105	.0108059	82.5136	278.8118	15.53215	.00024265
86 17A	MIR (Peace)	16609	160.87540	51.6286	195.2776	.0018081	81.7356	278.4287	15.71795	.00000000

* VANGUARD 2 RKT.

00012U 59AEP 2 87111.05884773 .0000164 00000-0 99999-4 0
00012 32.8878 266.5780 1758505 93.3072 286.9103 11.24902867

* VANGUARD 3

00020U 59013A 1 87179.49114673 .00000230 00000-0 99999-4 0
00020 33.3004 302.0668 1792514 12.5739 351.4107 11.28970075

* Explorer 7 RKT

00023U 59101 2 87166.38206125 .00001059 00000-0 78183-4 0
00023 50.2918 [illegible] 0122042 300.6601 64.2463 15.02012101

* Explorer 16

00506U 62d-C 1 87179.12975542 .00000082 00000-0 99999-4 0
00506 51.9977 250.2956 0287481 110.2617 246.8101 13.82003490

* COSMOS 538

11097U 65 14 A 87172.81969169 .00000457 00000-0 23884-4 0
11097 65.0126 12.5782 0024310 212.5243 147.4396 15.22044228

* COSMOS 113

02168U 66 19 A 87178.56367142 .00000486 00000-0 99302-4 0
02168 64.9897 341.7047 0018911 295.3083 64.0018 15.49884034

* MIDAS 8

02403U 66077 A 87176.38013949 .00000001 00000-0 99999-4 0
02403 89.7541 295.8932 0023536 183.3945 176.6957 8.59896251

* MIDAS 9

02481U 66 89 A 87169.75571012 .00000001 00000-0 99999-4 0
02481 90.1866 119.0421 0028654 76.5756 283.8272 8.59240542

* COSMOS 286

03150U 68 19 A 87179.66313743 .00002566 00000-0 61432-4 0
03150 81.1793 282.6053 0008329 149.3650 210.8090 15.41189389

* Explorer 40

03336U 68 6B B 87165.05892491 .00000003 00000-0 00000 0 0
03336 80.6689 152.7787 1140088 243.9058 103.9752 12.19409250

* WAR WING RKT.

05581U 71 93 B 87173.82398198 .00000156 00000-0 41718-4 0
05581 82.0514 254.1821 0047619 174.9916 185.8192 13.64958414

* AUREOLE 1 RKT

05730U 71119 B 87177.19309039 .00000945 00000-0 99999-4 0
05730 73.7843 137.7282 1146668 274.0803 73.0210 12.97579856

AR-ABAT 1.1X1.5 meters 137.44 MHZ

07752U 75 33 A 87178.33366580 .00001701 00000-0 99999-4 0
07752 50.6758 162.5895 0019019 113.3918 246.8977 15.14162707

* CENTAUR 8.6X3

12908U 78 16 C 87177.06866159 .00026945 00000-0 87689-3 0
12908 26.3841 218.8576 5065966 82.6889 329.8118 6.41431636

* AUREOLE 3 RKT

12849U 81 94 B 87179.31597131 .00001706 00000-0 18020-3 0
12849 82.5020 126.8973 1028978 147.3912 219.6269 13.20961300

SALYUT 7

13136U 82 14 B 87174.13658388 .00178642 67124-5 19692-2 0
13136 26.9073 162.6849 5644619 89.9119 331.1901 4.70399324

COSMOS 1400

13402U 82 79 A 87177.83646054 .00000141 00000-0 18201-4 0
13402 81.1629 283.5463 0015804 152.8397 207.3647 14.78358894

* OHZORA

14722U 84 15 A 87176.75386357 .00023071 00000-0 39166-3 0
14722 74.5684 294.7609 0197705 54.7785 307.1746 15.31650227

* COSMOS 1602 OCEANOGRAPHIC

15331U 84106 A 87178.89720284 .00000607 00000-0 35293-3 0
15331 82.5382 283.7127 0023599 273.2750 86.5759 14.73624418

* COSMOS 1603

15333U 84106B A 87178.89720284 .00000607 00000-0 35293-3 0
15333 82.5382 283.7127 0023599 273.2750 86.5759 14.73624418

NOAA 9 137.62

15427U 84123 A 87177.38001472 .00000103 00000-0 99999-4 0
15427 99.0113 143.1051 0013540 177.5010 182.6232 14.11800344

GEO SAT 150.012

15595U 85 21 A 87175.37994526 -.00000001 00000-0 00000-0 0
15595 100.0359 154.4671 0002473 284.3067 75.7108 14.31621400

COSMOS 1655 137.62 MHZ

15751U 85 41 A 87178.74520373 .00000095 00000-0 99999-4 0
15751 82.9721 [illegible] 0026075 332.6005 27.2900 13.70533706

* COSMOS 1624

15830U 85 50 A 87175.00498157 .00001157 00000-0 48207-4 0
15830 66.0342 270.2920 0017661 273.8884 86.3961 15.25704154

ZTV 1

16328U 85114 A 87176.40744671 .00000806 00000-0 14243 0
16328 37.0603 184.6635 0295041 61.9337 301.0978 15.17218004

ZTV 2

16329U 85114B A 87179.85765983 .00023580 00000-0 12787-2 0

Attend and Support your local Hamfest

Tell them where you saw it!

By Walter Komlsy

The Ultimate ZX81/T1000

Making many improvements in a good little computer. . .

In this article, I will show you how to revise your original "little wonder" Sinclair into a fully decoded 64K computer, with everything built onto the circuit board.

The circuitry uses latest IC technology, has write protected NVRAM at 8-16K and 32-64K, includes the "Oliger" circuit for M.C. at 32-48K and is fully decoded.

Also included are an LED on/off indicator, a trickle-charged two-battery circuit to insure NVRAM integrity, COAX output for the Zenith ZVM-123 green monitor, heatsink on the ULA, LOAD/SAVE switch for recorder, reset switch, flat cable connection for rewired TI99A keyboards and 8-16K on/off switch that permits use of the rear connector for plug-in boards configured to the 8-16K area.

By plugging in a revised 32K bank switched "Hunter" board, from a previous article (TSH 19, p. 13), you end up with a 96K Sinclair with 72K of NVRAM available for permanent storage.

This project requires careful soldering, accurate circuit tracing to find donuts used as wiring points, careful cutting of PCB traces, making up a small circuit board and a lot of ingenuity. Care must be used in handling the CMOS IC's and all soldering must be done with a grounded micro tip iron. Be prepared to clean all solder joints with an effective flux remover.

Since the IC's plus circuit board stand 2" above the original PCB, the top of the case will need large cut-outs if you still use the membrane keyboard with its problems. I suggest a TI99A full size keyboard be rewired as a preliminary project, since this revision is devised with everything mounted to a 10"X12" piece of

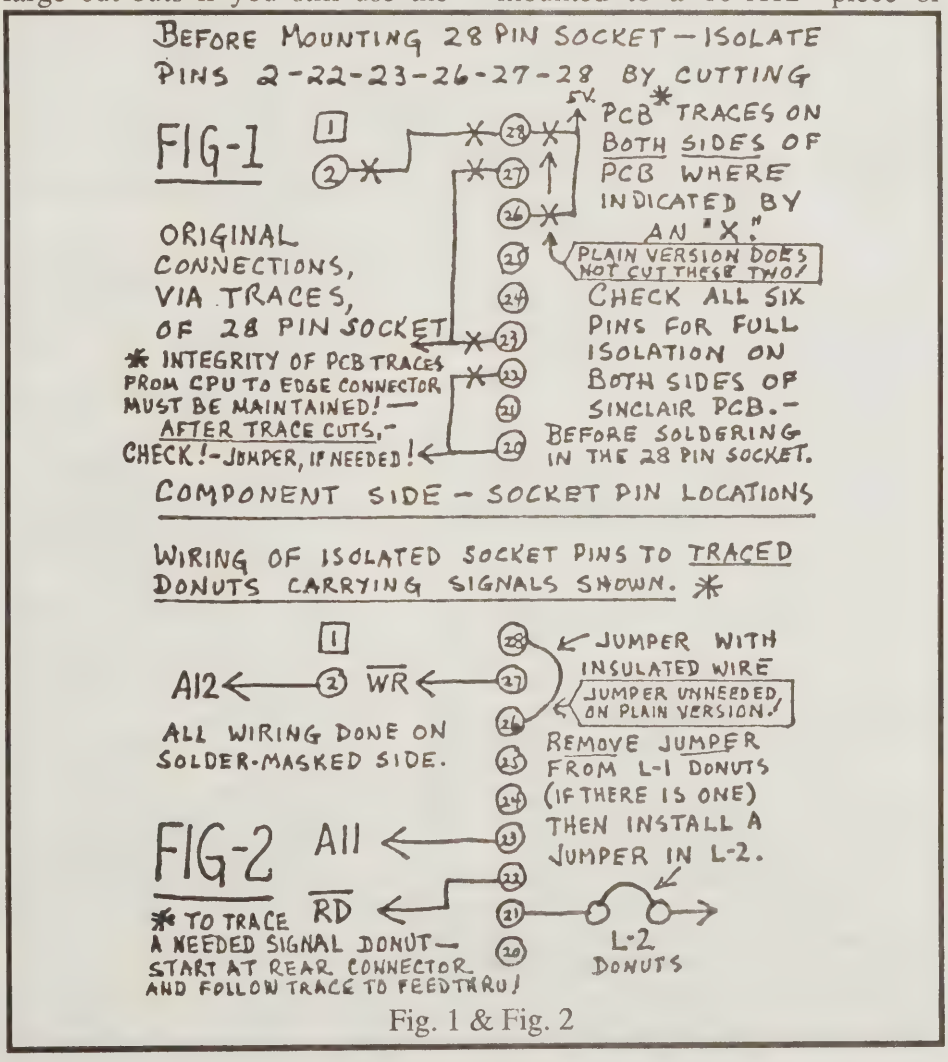

BEFORE MOUNTING 28 PIN SOCKET — ISOLATE PINS 2-22-23-26-27-28 BY CUTTING
FIG-1
ORIGINAL CONNECTIONS, VIA TRACES, OF 28 PIN SOCKET
* INTEGRITY OF PCB TRACES FROM CPU TO EDGE CONNECTOR MUST BE MAINTAINED! — AFTER TRACE CUTS, CHECK! - JUMPER, IF NEEDED!
5V.
* PCB TRACES ON BOTH SIDES OF PCB WHERE INDICATED BY AN "X."
PLAIN VERSION DOES NOT CUT THESE TWO!
CHECK ALL SIX PINS FOR FULL ISOLATION ON BOTH SIDES OF SINCLAIR PCB. - BEFORE SOLDERING IN THE 28 PIN SOCKET.
COMPONENT SIDE - SOCKET PIN LOCATIONS
WIRING OF ISOLATED SOCKET PINS TO TRACED DONUTS CARRYING SIGNALS SHOWN. *
A12
WR
ALL WIRING DONE ON SOLDER-MASKED SIDE.
JUMPER WITH INSULATED WIRE
JUMPER UNNEEDED ON PLAIN VERSION.
REMOVE JUMPER FROM L-1 DONUTS (IF THERE IS ONE) THEN INSTALL A JUMPER IN L-2.
FIG-2
A11
RD
* TO TRACE A NEEDED SIGNAL DONUT — START AT REAR CONNECTOR AND FOLLOW TRACE TO FEEDTHRU!
L-2 DONUTS

Fig. 1 & Fig. 2

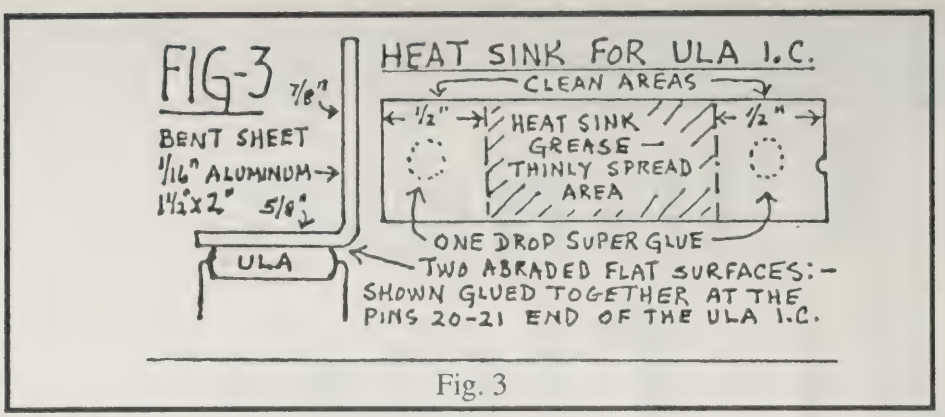


Fig. 3

1/2" plywood and the black plastic case discarded. There is room on the board for the 2040 interface and a plug-in board, behind the PCB rear edge connector.

TI99A full size keyboards are still available at less than $10 from several suppliers.

First get your computer completely disconnected and take it apart so you have only the PCB in front of you, component side up with aluminum heatsink at lower left.

A kit-built ZX81 will have two small socketed IC's, which you now remove from their sockets and discard. You will have to cut out the two center ribs of the 28 pin TI socket so it can be installed with the small socket left in place.

If your PCB has a single socketed or soldered in 24 pin RAM at the right below the edge connector, you must remove the socket and/or RAM and clean out the plated-thru holes with a solder sucker or soldering wick. Four extra donuts, at the top, must also be cleared so you end up with a footprint for a 28 pin socket on the PCB. Try the socket in the cleared holes; if it fits, remove it and continue: if it doesn't fit, you have to clear the obstructing holes until it does.

Before installing the 28 pin socket you must cut the traces on the PCB at the places shown in Fig-1. Verify each trace cut with an ohmmeter. When the 6 pins are verified as isolated you can install the 28 pin socket and solder it in.

Trace out the nearest locations of feed-thru donuts carrying the signals required and wire them up to the now isolated donuts of the 28 pin socket as shown in Fig-2. Do this wiring on the solder masked underside of the PCB using the wire specified in the parts list.

Before going on, carefully remove the ULA I.C. from its socket and with a piece of fine emery cloth or sandpaper on a hard, flat surface, rub the top of the ULA against the abrasive with several even strokes until the top is a flat, dull surface with no printing visible. Put the piece of 1/16" aluminum in a vise, 2" side horizontal and 5/8" into the vise, between two pieces of thin cardboard to protect the flat surface and tighten securely. With a short piece of 2X4 bend the protruding 7/8" aluminum until it is against the top of the vise. Remove it and smooth the smaller side on the flat abrasive as with the ULA. Clean off both ULA and heatsink where you abraded them. Place a thin coating of heat sink compound on the top of the ULA, leaving 1/2" clear at both ends. Place one drop of super glue at each end of the top of the ULA, centered in each clear area, and fit the abraded side of the heatsink to the top of the ULA (see Fig-3); holding the sandwich at both ends, press and hold them firmly together for at least 15 seconds and they should be stuck. Place spring type clothespins as clamps at each end and set the assembly aside to age.

John Oliger's circuit for M.C. use of the 32-48K section of memory must be done on the underside of the PCB. Traces are cut and verified first, then the HCT-10 and HCT-08 are foam taped, with pins up and oriented as shown, inside the footprint of the ULA socket and wired as in Fig-4.

Full decoding uses the HCT-138 I.C., which is foam taped, with pins up, in the same location on any version PCB after initial

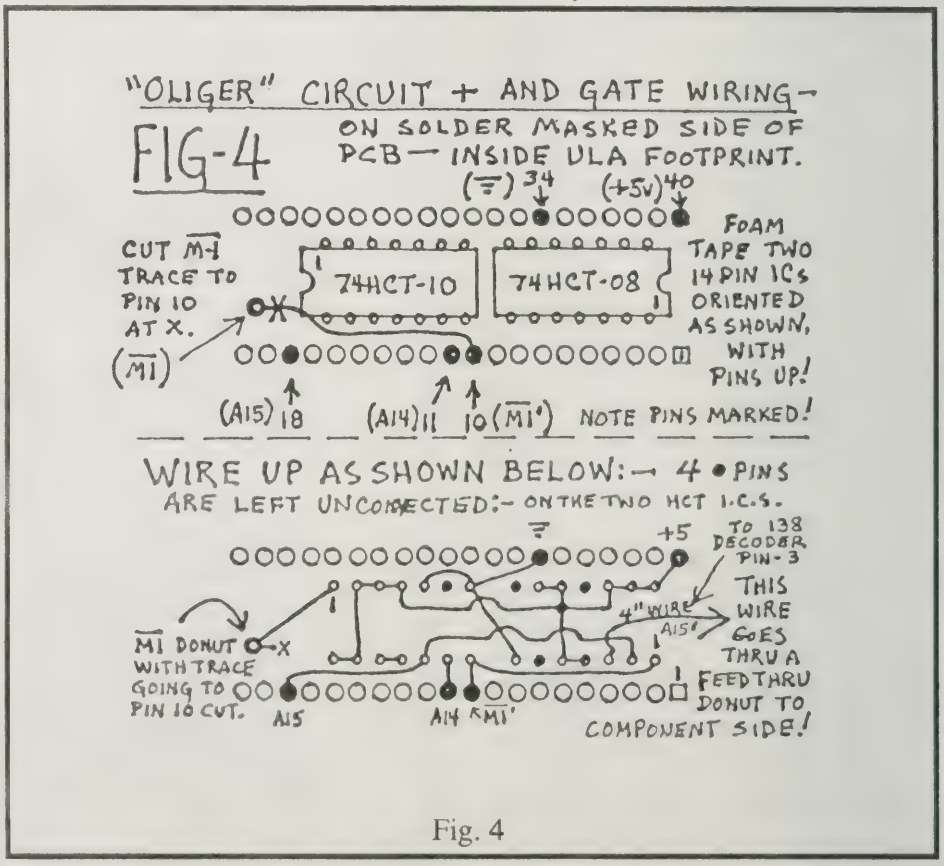


Fig. 4

Tell them where you saw it!

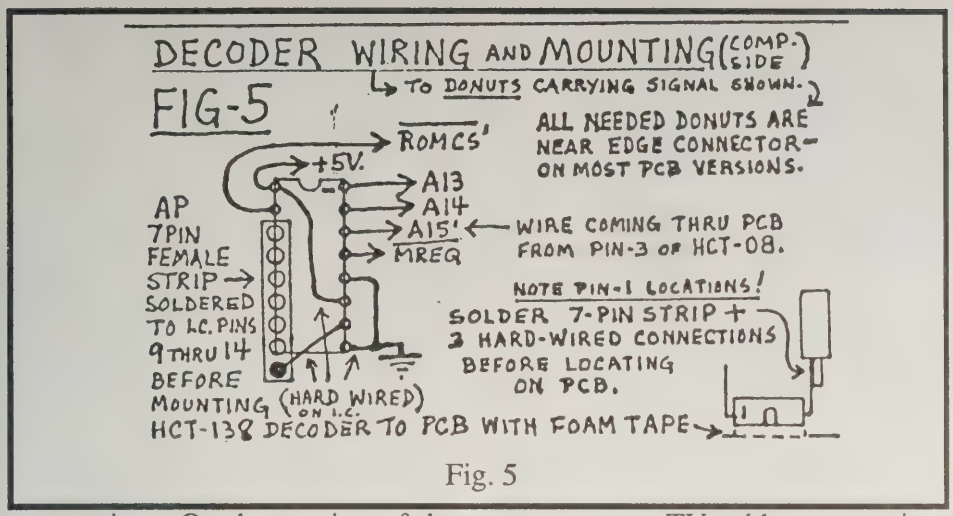

DECODER WIRING AND MOUNTING (COMP. SIDE)
FIG-5
TO DONUTS CARRYING SIGNAL SHOWN.
ALL NEEDED DONUTS ARE NEAR EDGE CONNECTOR— ON MOST PCB VERSIONS.
ROMCS'
+5V.
A13
A14
A15'
MREQ
WIRE COMING THRU PCB FROM PIN-3 OF HCT-08.
AP 7PIN FEMALE STRIP → SOLDERED TO I.C. PINS 9 THRU 14 BEFORE MOUNTING (HARD WIRED ON I.C.)
NOTE PIN-1 LOCATIONS!
SOLDER 7-PIN STRIP + 3 HARD-WIRED CONNECTIONS BEFORE LOCATING ON PCB.
HCT-138 DECODER TO PCB WITH FOAM TAPE

Fig. 5

preparation. On the version of the ZX81 with two small RAM sockets it is taped to the RAM socket nearest the center of the PCB. On all other versions it is taped to the footprint of the same socket on the PCB.

Preparation of the I.C. consists of soldering the female 7 pin connector to the I.C. pins as shown in Fig-5. Use black conductive foam on the row of I.C. pins not being soldered and be sure to use a grounded tip iron. If possible, ground your hands to the grounded tip while handling any CMOS chips.

Before mounting the HCT-138, trace and identify the donuts carrying the signals needed for the decoder and the +5V and ground lines.

Mount the decoder I.C. and wire in the balance of pins as in Fig-5. **NOTE:** From now on, when wiring from PCB to an I.C. pin, cut each wire to the correct length, strip both ends and always solder first to the PCB donut and then to the I.C. pin.

One wire from pin 3 of the decoder must pass thru the PCB via an unneeded feed-thru donut to pin 3 of the HCT-08 and gate under the ULA chip. The specified wire nicely fits thru the donuts.

Now cut out the 680 ohm resistor marked R-28 near the V.R. on the ZX81 and between the ULA and CPU on others.

See Fig-6 for computer connection to a Zenith monitor, ON/OFF indicator LED and tape recorder switch. You can use your original computer to TV cable or any piece of 75 ohm coax with an RCA male plug at one end. With the original cable, cut off one of the RCA plugs and strip off 3/4" of the plastic outer cover. With a pin, separate the braid and twist it into a lead at right angles to the cable. Strip off 1/2" of the inner plastic leaving the core wire exposed. Tin both the core wire and the braid lead with solder. Wrap several turns of 1/2" Mylar, Teflon or paper tape at a point 3/4" back from the end of the outer plastic covering as protection from soldering heat. Take a small piece of thin solderable metal, cut a strip 1"X1/4" and bend it round the taped cable, then out, to form a tight fitting clamp as shown.

Remove the label from the modulator metal box at the upper left corner of the PCB and using a soldering gun, tin the top of the box where the braid and clamp will be soldered. Then tin both sides of the flat portions of the clamp. With the cable centered atop the box and the exposed inner plastic insulation ending at the lower edge of the

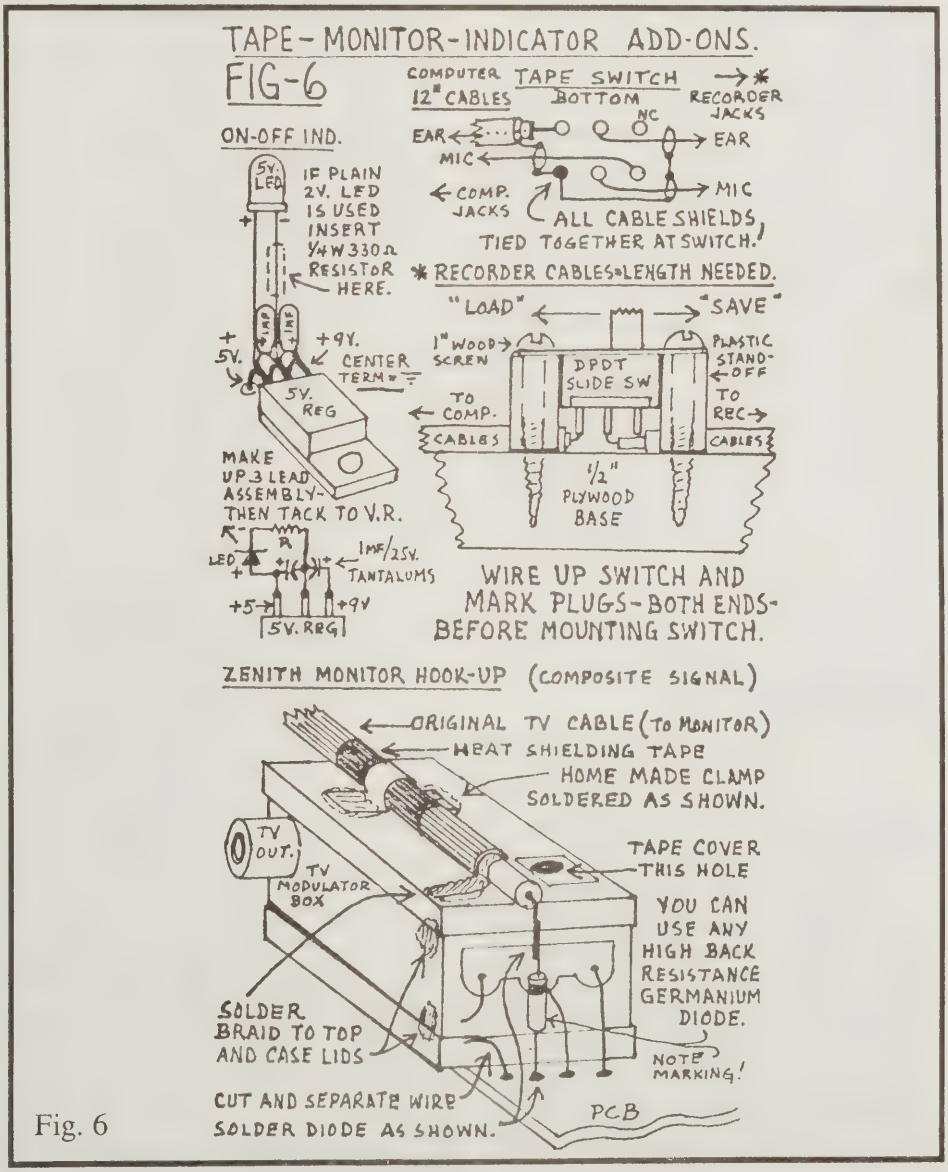


Fig. 6

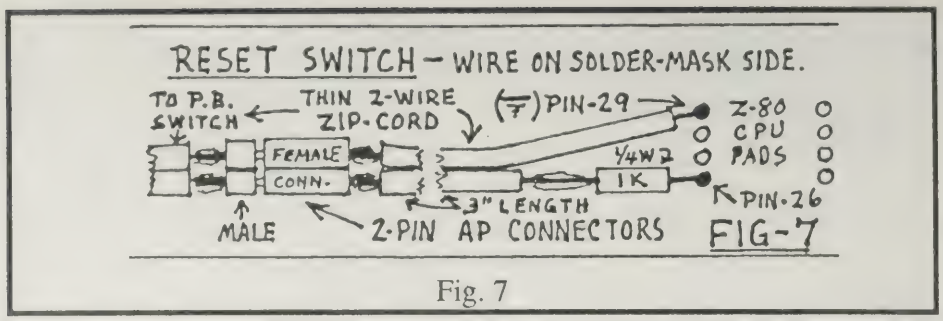


Fig. 7

box, solder the braid quickly. Bond the top and side of the box with a generous solder bead at the corner below the braid for ground integrity. Place the clamp over the center of the taped area and quickly solder it in place. Cut the leads of the germanium diode to 1/4" and quickly solder the unmarked end to the second donut in from the left edge which is empty on all versions. Bend the coax center lead at right angles to meet the marked end of the diode and quickly solder together. Cover the hole atop box with tape. Cut the wire lead at the left of the diode and separate them; this disables TV output but bringing the two cut ends together and a bead of solder will enable it, if ever needed again.

The tape switch controls load/-save connections without pulling out any jacks. Ground integrity must be maintained by soldering all braid shielding together at the switch. Video cable with molded-on miniature plugs is recommended, but if you make up your own try to use shielded plugs. Connections to the computer can be either via plugs into the jacks, which is advised since it gives easy disconnect to service the PCB, or hard wiring to the jacks which will complicate servicing.

The switch will end up, mounted with two spacers and wood screws, somewhere in the upper right corner of the plywood base at a location you choose.

The ON/OFF indicator LED is first made up as shown to end up as a 3 lead module that is soldered to the three leads coming out of the on-board V.R. The two capacitors provide additional filtering and stability to the V.R. and aid in holding the LED upright. If you wish you can use any LED with a 330 ohm 1/4 watt resistor in series with one lead. NOTE: the caps must be connected directly to the V.R. leads.

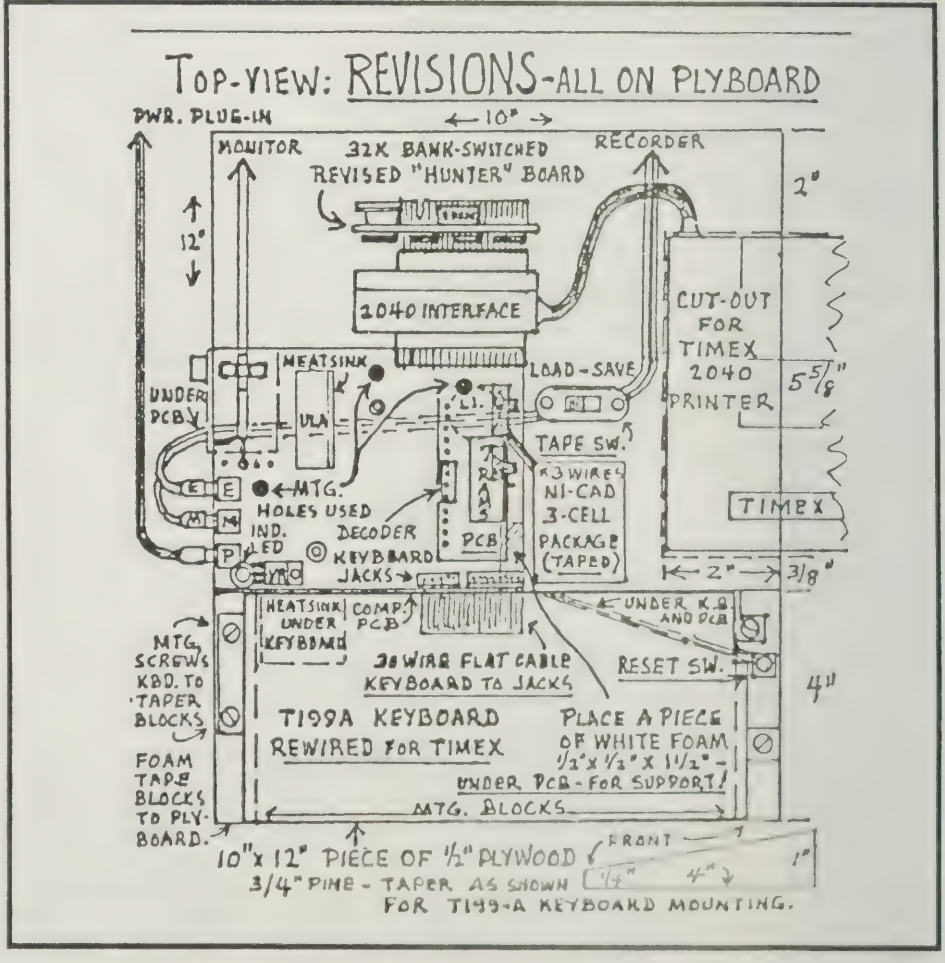
This is a good time to add a reset switch if you have none. Fig-7 shows the needed wiring on the solder masked side of the PCB. You can use any type of momentary switch and mount it where you please for easy access. You should break the two wires and insert a male/ female 2 pin connector for easy disconnect if PCB service is ever needed. The same type connector used on the decoder I.C. are ideal.

The ZX81 versions should be checked for a jumper in L-1; (4118-24 pin RAM). It must be removed. All ZX81 PCBs will require a jumper be installed between donuts marked L-2.

Now is decision-making time: everything done so far is required for 64K. Now you have a choice - you can go for the works, which requires a small PCB to be made up, mounted and wired to the stack of 7 I.C.s you solder together next, or you can go for a standard 64K without non-volatile sections of RAM, that needs no PCB.

Whatever your choice Fig-8 shows the details of the stack of 7-6264 RAMs that will end up in the 28 pin socket you installed.

Taking precautions against static discharge, start by bending all seven RAM's pins inward until at right angles to the plastic body and they will properly fit into the 28 pin socket. Bend all pins 20 out until they are parallel with the plastic body. Push one RAM into a piece of black conductive foam then, keeping all seven oriented the same way, press another RAM onto the other, making sure all pins line up, until the plastic bodies are



Tell them where you saw it!

touching. The pressure of the pins will hold the stack together. When you have a stack of all seven RAMs with pins 20 sticking out in a line and with the bodies all touching, quickly solder all pins 14 and 28 to hold the stack firm.

The best way to solder the balance of the pins is to have the stack with pins up and with a small piece of black foam 5/8" X 2" pushed between the top protruding pins. Hold the stack, in some manner, at a 45 degree angle for easier soldering and to help keep the solder where needed, at the wide part of each pin.

In the ultimate version, prior to soldering the line of pins 27, bend out the slim part of pin 27 - of the third I.C. from the bottom, to break contact with the bottom two pins. Now solder the top 5 pins together and the bottom 2 pins together. Push the pins of the RAM stack into a piece of black foam and set it aside.

The plain version needs only the wiring shown in Fig-9 for completion.7-wire flat cable is ideal for use between the male connector and flying leads pins 20; run it over the RAM stack and down to the pins.

For use of 8-16K plug-in boards, use the circuit shown to switch the decoder chip select line to on-board RAM or plug-in memory.

In this case, the lead from decoder pin-14 of the flat cable goes to the center contact of the mini spdt slide switch that you mount to the top of the RAM stack, at the notched end. Foam tape side of switch to top RAM with actuator on same side as flying leads and wire up as shown in lower part of Fig-9. The common end of the two 10K pull-up resistors is soldered to either pin.

Cut the trace to top edge connector 14 (MREQ) right at the point where the trace widens to become the connector and solder the switch wire to the cut end of the wide connector trace.

When switch wiring is finished, epoxy the switch to the top RAM for stability.

The plain version is now completed and ready for testing.

The small PCB (1-1/4" X 3") is now your chore. The mask shown in Fig-10 is the one used here with AZ-111 positive resist on single sided G-10 PCB stock. However you devise yours the circuitry needed is shown in Fig-10.

When your board is completed and verified, it will be foam tape mounted atop the RAM stack, with components down, and copper side up for further wiring. 3/8" to 1/2" space must be left clear on the component side, as shown, for tape mounting. The wide copper strip along one edge was left unetched to provide a means of soldering subminiature slide switch metallic cases to the PCB. Foam tape or epoxy will also do this chore.

Your ingenuity will dictate how you mount your two spdt switches near the positions shown on the copper side of the PCB. Do not solder in the lithium cell or nicad pack before all is tested and working.

With the board taped atop the inserted RAM stack complete the wiring between the decoder male plug and small PCB and RAM stack. Wire the switches and two 10K pull-up resistors; then run the one wire to the top-14 (MREQ) edge connector.

Before testing, both versions must remove and replace, or jumper, C-9 with the 1 MFD. Mini ceramic capacitor, keeping the leads as short as possible. If C-9 is a disc ceramic, replace it. If it is a tubular glass ceramic, jumper it.

With everything wired and double checked, except batteries, you are ready to check for 64K RAM operation.

Plug in power and display. Set 8-16K switch to "ON" and, if ultimate NVRAM PCB version, WRITE/PROTECT switch to "WRITE".

Without attaching the keyboard, turn on the power. If the K cursor appears after some 5 seconds, you have done a good job of locating the correct donuts on the computer board and RAM connections may be O.K. Now remove the power and switch the WRITE/PROTECT switch to "PROTECT" and turn the power on again. If the K appears as before, you have wired the 16-32K RAM correctly to be volatile. If the cursor does not show, you must check your work for errors or solder bridges on both sides of the PCB. First clean all solder connections made to the PCB with an effective flux remover, then examine the PCB with a magnifying glass for problems. Retrace all donuts and trace cuts made, for proper signal lines.

After passing the two tests, you must connect your keyboard to the PCB. Should you have a full size keyboard directly soldered to the PCB it will make revision very difficult and my suggestion would be to place a set of male/female connectors in your keyboard to computer cable for quick disconnect, before starting this project.

With keyboard connected you can proceed with testing your revision, but first set the W/P switch to "WRITE".

When cursor appears enter program shown and run.

```
10 FAST
20 FOR N=8192 TO 16383
30 POKE N,170
40 IF NOT PEEK N=170
THEN STOP
50 NEXT N
60 STOP
```

A 9/60 error code shows all is well. A 9/40 immediately indicates trouble; W/P switch wired wrong or it is not set to write position. Check out all wiring for 8-16K RAM.

NOTE: The 8-16K switch must be "ON" during these tests for either version.

If all is well to this point, change line 20 of the program to read:

```
20 FOR N= 32768 TO 65535
```

And again run the program. This time it will take four times

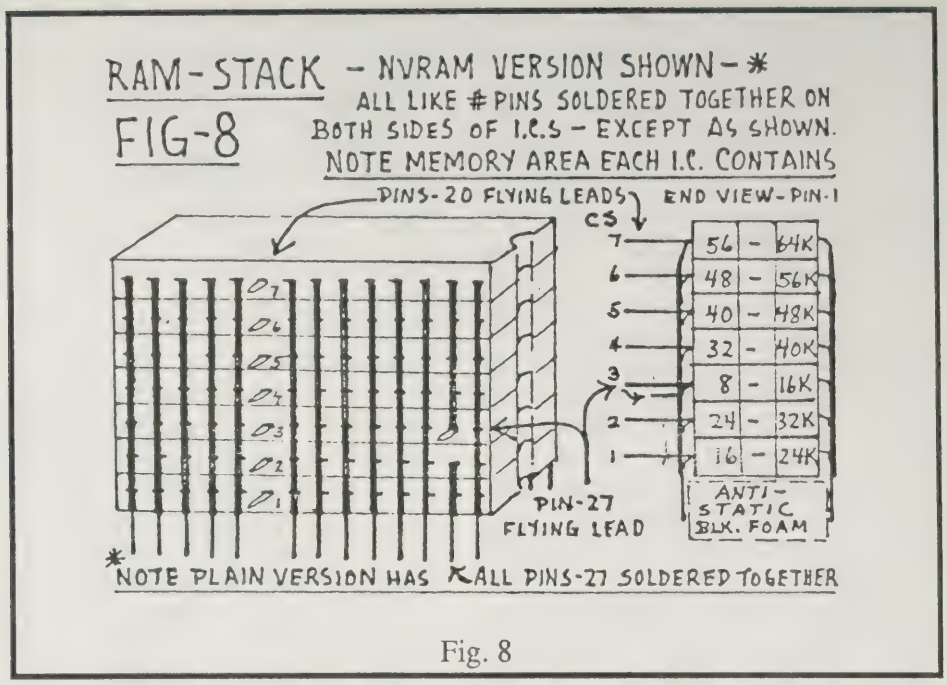


Fig. 8

longer for a 9/60 error code to appear if all is well. Should a 9/40 error code appear, check out the circuits for the four 8K areas between 32-64K.

To test the "Oliger" circuit enter the following direct commands (W/P Switch= "WRITE"):

```
POKE 40958,1
POKE 40959,3
POKE 40960,217
POKE 40961,201
PRINT USR 40958
```

Upper left screen will show "55555" if it is working O.K. Any other result means you must check out the trace cuts and wiring of the HCT-10 and ULA under the PCB.

With the passing of these tests, you have 64K of working memory and can use machine code at 8-16K and 32-48K.

The plain version is now fully tested and can be assembled on the plywood board.

Now the battery circuit must be made up. With 3 AA nicads, form a flat pack 1-3/4" X 2" X 1/2" by taping them together with masking tape around the middle. Wire them in series and solder a 2-3/4" wire to the positive (+) terminal at one end. Slide the free end under the masking tape so it protrudes above the nicads. Make up the series 68 ohm resistor and 1N4148 module and solder the wire to the resistor. Solder a 4" wire to the open end of the diode and mark this wire (5V). Solder a second 7-1/2" wire to the (+) terminal and route it alongside the first under the tape. Mark this wire as "(+)". Solder a 4" wire to the (-) open end terminal. Wrap tape around the small module to fully insulate all solder joints and, with it pressed against the ends of the 3 nicads, wrap masking tape around the nicads to fully insulate the entire package with three wires sticking out of the end with the (-) terminal.

Before enclosing the nicad pack in masking tape, make sure it is fully charged and the voltage between the two end terminals is between 3.8V. and 4.2V. with a 200 ohm resistor momentarily loading the 3 cell pack. Charge at a 50MA. rate until the pack passes this loaded test.

Temporarily, tack the 3 wires to the small PCB, as shown and turn on the computer, all switches set as before. Enter and run the following program:

```
10 FAST
20 FOR N=8192 TO 16383
30 POKE N,255
40 IF NOT PEEK N=255
THEN STOP
50 POKE N,0
60 IF NOT PEEK N=0 THEN
STOP
70 NEXT N
80 FOR N=32768 TO 65535
90 POKE N,255
100 IF NOT PEEK N=255
THEN STOP
110 POKE N,0
120 IF NOT PEEK N=0
THEN STOP
130 NEXT N
140 STOP
```

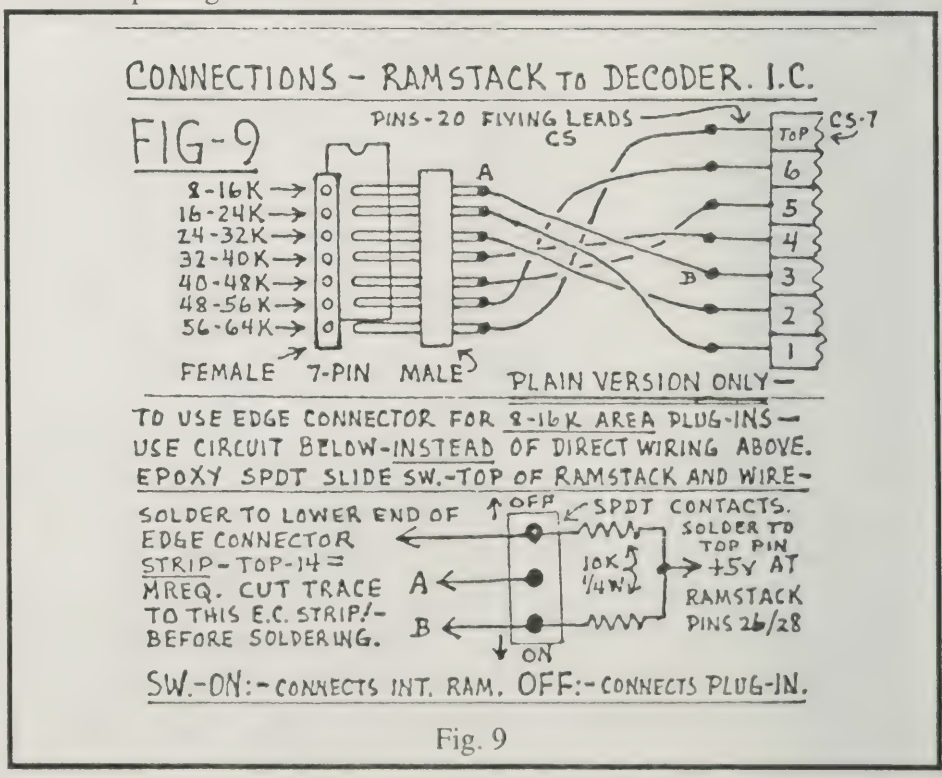


Fig. 9

Tell them where you saw it

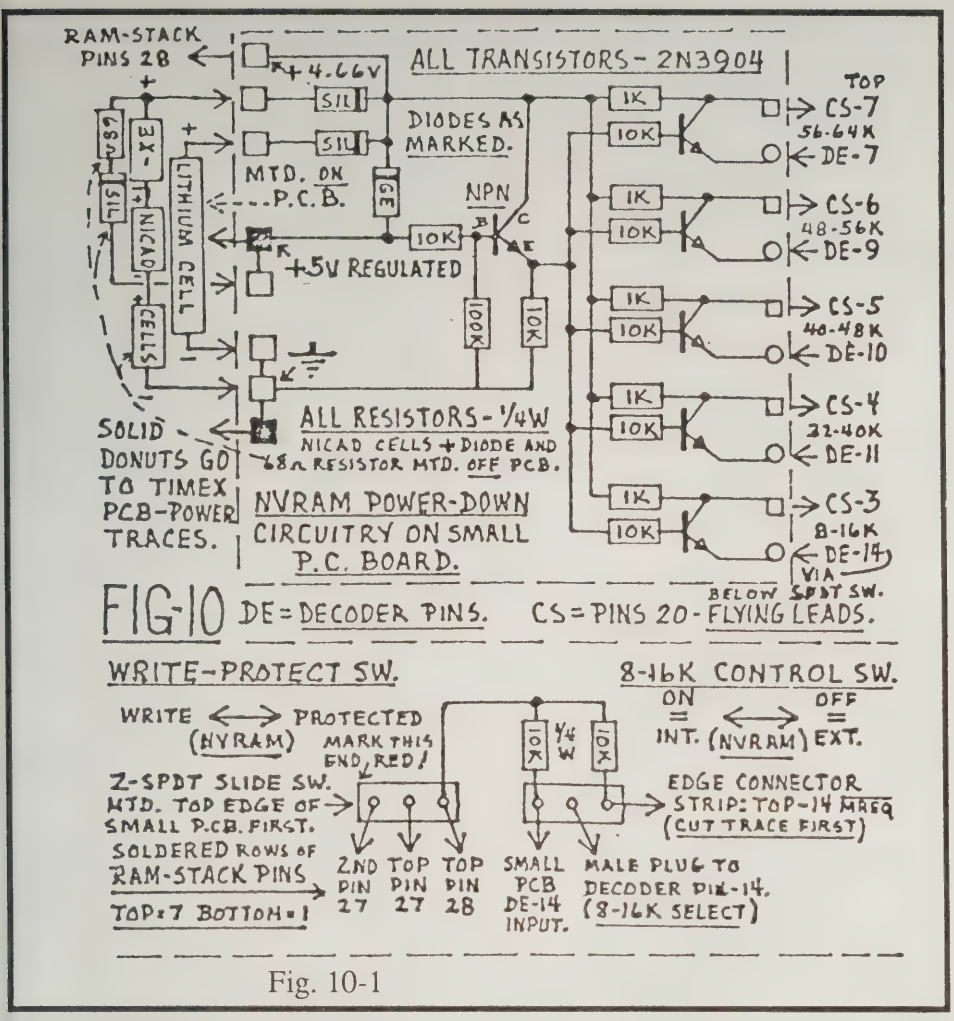


Fig. 10-1

If, after several minutes, the 9/140 error code appears, set the W/P switch to "PROTECT" - turn off the computer and have a cup of coffee. You deserve it.

The last test checked every location in NVRAM and left a "0" in each byte, protected against change by the nicad pack and small PCB circuitry. Leave the W/P switch as is - turn on the computer and enter and run this program:

```
    10 FAST
    20 FOR N=8192
TO 16383
    30 POKE N,255
    40 IF NOT PEEK
N=0 THEN STOP
    50 NEXT N
    60 FOR N=32768 TO 65535
    70 POKE N,255
    80 IF NOT PEEK N=0 THEN
STOP
    90 NEXT N
    100 STOP
```

A 9/100 error code means all data has been retained and the W/P switch, small PCB and nicads are all wired correctly and doing their job.

You can now solder in the lithium back-up cell, mindful of polarity, pushing the leads up thru the PCB from the component side.

The final test is to plug in a "Hunter", or similar board, decoded to the 8-16K region and with the 8-16K switch set to "OFF", verify that the board now occupies the 8-16K area of fully decoded memory.

Now is the time to mount all the component parts onto the plywood board to end up with a complete, moveable unit. The drawing shows the placement used here. Your set-up will be to suit your own needs and space.

To those readers with TI-99A reworked keyboards:- I offer the next few suggestions, that, after

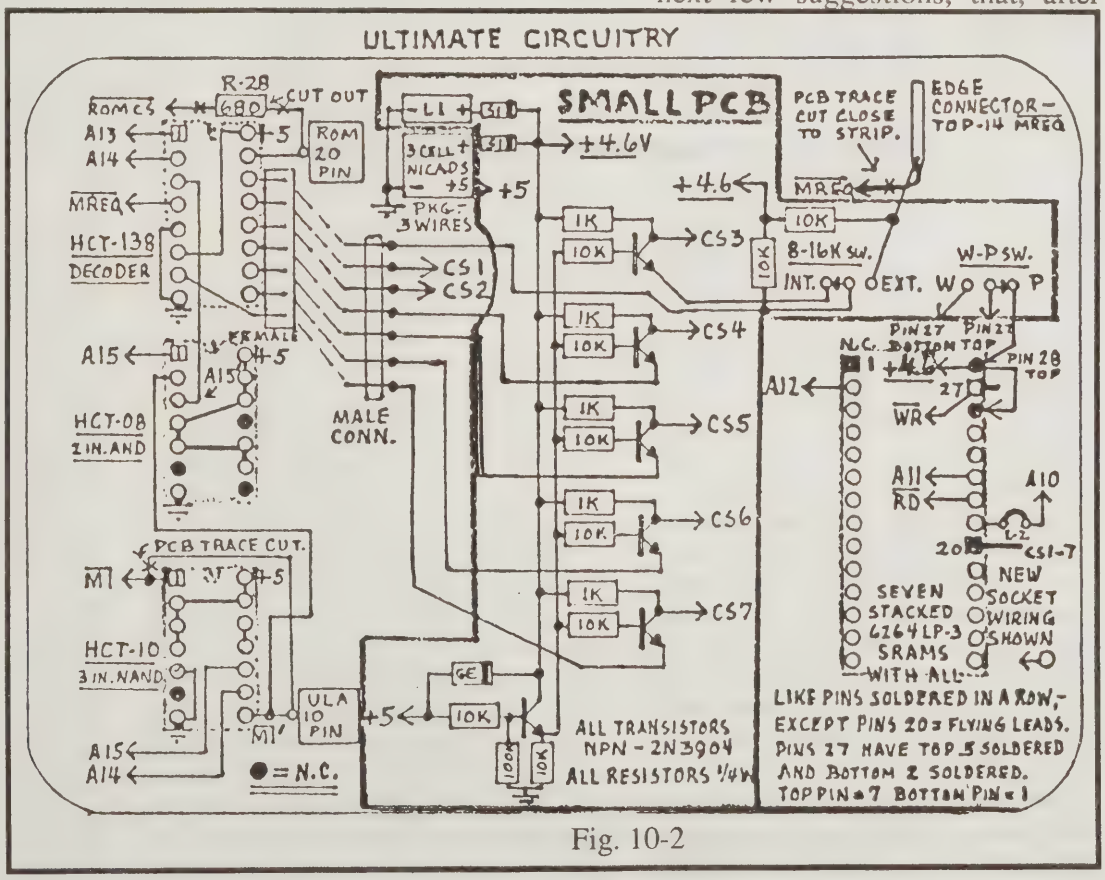


Fig. 10-2

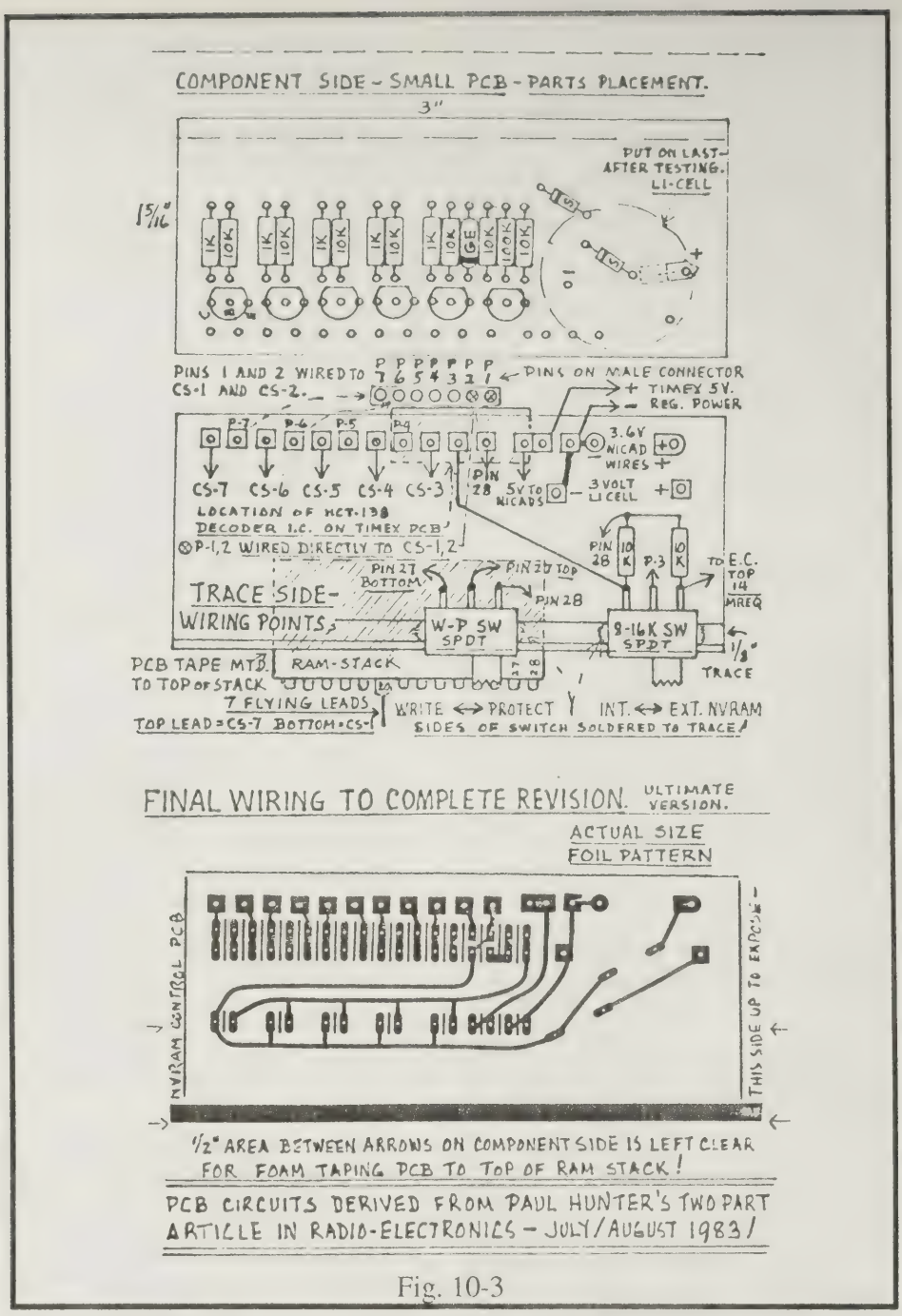

COMPONENT SIDE - SMALL PCB - PARTS PLACEMENT.
3"
15/16"
PUT ON LAST-AFTER TESTING. LI-CELL
1K
10K
100K
GE
PINS 1 AND 2 WIRED TO CS-1 AND CS-2.
P 7 P 6 P 5 P 4 P 3 P 2 P 1
PINS ON MALE CONNECTOR
+ TIMEX 5V.
- REG. POWER
P-7 P-6 P-5 P4
3.6V NICAD WIRES
CS-7 CS-6 CS-5 CS-4 CS-3
PIN 28
5V TO NICADS
3 VOLT LI CELL
LOCATION OF HCT-138 DECODER I.C. ON TIMEX PCB
P-1,2 WIRED DIRECTLY TO CS-1,2
PIN 27 BOTTOM
PIN 27 TOP
PIN 28
P-3
TO E.C. TOP 14 MREQ
TRACE SIDE-WIRING POINTS
W-P SW SPDT
8-16K SW SPDT
1/8" TRACE
PCB TAPE MTD. TO TOP OF STACK
RAM-STACK
7 FLYING LEADS
TOP LEAD = CS-7 BOTTOM = CS-1
WRITE ↔ PROTECT
INT. ↔ EXT. NVRAM
SIDES OF SWITCH SOLDERED TO TRACE!
FINAL WIRING TO COMPLETE REVISION. ULTIMATE VERSION.
ACTUAL SIZE FOIL PATTERN
NVRAM CONTROL PCB
THIS SIDE UP TO EXPOSE
1/2" AREA BETWEEN ARROWS ON COMPONENT SIDE IS LEFT CLEAR FOR FOAM TAPING PCB TO TOP OF RAM STACK!
PCB CIRCUITS DERIVED FROM PAUL HUNTER'S TWO PART ARTICLE IN RADIO-ELECTRONICS - JULY/AUGUST 1983!

Fig. 10-3

revising four keyboards, have proved dependable, neat and removeable for service, when needed.

Mount your keyboard on two tapered 3/4" thick wood blocks, one at each end, under the metal ears as shown. Then secure the assembly to the front of the plywood base with double sided foam tape, lining up the front edge of the metal keyboard base with the edge of the plywood. This will give your keys a good angle to see and work with and provide an airspace below the keyboard for the PCB Or heatsink.

Use strip .025 male connectors (5 and 8 pins), as push-in contacts to the original mylar keyboard connector sockets on the PCB.

Starting with a 8" to12" length of 30 wire, .05 spacing, flat cable: use both outer edge wires to carry signals and leave a blank wire between each signal lead. With the flat side of the cable up: solder on the two strip connectors, following the sequence shown. Separate and cut off the six spacing wires between the KB and D sections, 1" back from the end of the cable. The sequence of signals required by the PCB connector sockets are (KB4-3-2-1-0) (- - - - - -) (D1-2-3-4- 5-6-7-8); each "-" means an unconnected lead in the 30 wire cable.

Cut off the molex connector and short flat cable at the rear of the keyboard.

Draw a line on the other end of the flat cable 3" from the end and separate all the wires from the end to the line. Mark the side of the flat cable that has the KB4 lead and hold the cable with the marked side at your left. Following the sequence shown before, cut off all the spacer leads at the 3" marker line leaving you with 13 separate leads, each connected to a pin on the two plugs at the other end of the cable. Mark a line on the intact flat cable 1" from the first line and using strips of foam tape, cut to size and fitted to flat areas of the keyboard PCB, secure the flat side of the flat cable to the PCB with the last marked line at the rear edge and centered between the ends of the PCB. The length of flat cable used is up to you. If you duplicate my drawing, 7"-8" is ideal, forming a 2" loop to the jacks.

With keyboard mounted, slide the computer PCB heatsink under the keyboard, lining up the three jacks with the left side of the plywood. The front of the two keyboard jacks should be lined up with the back of the keyboard PCB. This will be the location of the computer PCB and you now, with a thin pointed scriber or long nail, held vertically from the plywood, mark the three locations indicated for the screws, thru the PCB mounting holes. Remove the PCB and, with an awl or 1/16" drill, make starter holes in the plywood for the screws. With a dab of rubber cement, tack three 1/2" long, 1/4" wide, tubular plastic spacers with 1/8" holes, centered over the starter holes, centered over the starter holes. Wait a few minutes for the cement to set, then carefully slide the heatsink under the keyboard and gently set the PCB into position with the three holes over the

Tell them where you saw it!

spacers. Put a small teflon washer on each screw and screw it into the starting hole thru the PCB and spacer.

With all screws started, check the position of the keyboard jacks to be sure there is room to insert the two plugs. If all is well, tighten the screws until they seat against the teflon washers and firmly hold the PCB in place. Do not overtighten. Now insert the two keyboard plugs, making sure the pins are centered on the jack contacts. You can fire up now and test if all keys work properly.

The last additions to the plywood base will be;- the nicad pack, which is foam taped to the board where shown;- the LOAD/SAVE switch, which is screwed to the board using the same plastic standoffs as the PCB;- and the reset switch placed and mounted at your discretion.

The end result is that a less than foot square area now holds a reliable 64K computer without tape noise or rampak connector problems and features not possible just a few years ago.

At current prices the entire project should cost no more than $50 for parts, and is well worth the cost and time, when completed.

I trust, if you undertake and complete this project, you will find you have a new admiration for Sinclair's "little wonder".

Parts required (as shown):

7 - HITACHI HM6264LP-15 IC
1 - 74HCT-138 DECODER IC
1 - 74HCT-10 3-INP NAND IC
1 - 74HCT-08 2-INP AND IC
6 - 2N3904 NPN TRANSISTORS
1 - 3V LITHIUM CELL W/PINS
3 - NICAD AA BATTERIES
1 - DPDT SLIDE SWITCH
2 - MINI SPDT SLIDE SWITCHES
1 - MOMENTARY PB SWITCH (N.O.)
1 - 5V LED W/INT RESISTOR
1 - 1 MFD/10V MINI CERAMIC
2 - 1N270 GERM DIODE
3 - IN4148 SIL DIODES
1 - 68 OHM 1/4 W RESISTOR
1 - 100K 1/4 W RESISTOR
6 - 1K 1/4 W RESISTORS
9 - 10K 1/4 W RESISTORS
1 - 28 PIN ST SOCKET (T.I.)
1 - LENGTH 30 COND FLAT CABLE
1 - SET M/F HEADER STRIPS (ST)
(36-40 PIN STRIPS-1/8"TAILS)

DOUBLE SIDED 3/4" FOAM TAPE
VERY THIN 1" WOOD SCREWS
NO.26-SOLID TEFLON INS. WIRE
1/4"ROUND FLAT TEFLON WASHERS
1/2"PLASTIC SPACERS 1/8" HOLE
1/16"FLAT ALUMINUM 2" X 1-1/2"
1" MASKING TAPE
1/2" PLYWOOD 10" X 12"
HEAT SINK COMPOUND
INSTANT BOND SUPER GLUE
5 MINUTE EPOXY

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The complete ultimate, as shown on the plyboard pictorial, has been operational and used daily here for over six months without problems.

The only hot spot on the PCB is the 7805 5V. regulator; the ULA, CPU,and ROM now only get warm. Since the total current drain of the full 64K Timex is less than 400 ma., the DC input to the 5V. regulator is well over 10V.; and it is the over 5V. drop in the V.R. that is producing most of the heat. A 7808 pre- regulator, or a 2"X4" piece of 1/16" aluminum screwed tightly to the 1/8" original heatsink, would help reduce the temperature of the VR to a very safe level. Without excessive heat or voltage stress, the 64K revision could operate forever.

The following suggestions will further long life and aid in operational integrity:

Install plug-in type noise and spike suppressor at AC outlet that supplies computer and all accessories.

If you own your home, install a surge and lightning arrestor at the AC entrance box.

If you make the ultimate revision on the plyboard, wire a 1000 to 2200 MFD./25V.- 85"C. miniature electrolytic across the power input jack (cap can be placed under the keyboard, below the nicad module).

If you have revised a "Hunter" board to 32K nvram and have it plugged in to make a 96K unit, get a "data sentry" mini 3.6V nicad from Meshna in E. Lynn, Mass. (cat-no. H-1A at $3) and tape it on one edge of a 1-1/2 square piece of perfboard. Use same 3 wire circuit from 3-AA cells but change the limiting resistor to 160 ohms. Mount diode/resistor behind nicad, tape the board in back of the no.-1 socket, with nicad lined up with the 4 sockets. Wire up the nicad + and - pins to the donuts provided on the "hunter" board (diode D2 must be installed) for an external back-up battery. Wire the free end of the diode to +5V regulated and your entire system is doubly protected against memory loss or change (except against your leaving the W/P switch in the "WRITE" position).

Install a battery back-up for the computer (there are several types shown in *"Syncware News"*- Volume 1), in place of the hi-cap reservoir suggested.

Of course - the very ultimate suggestion is to get two 6V-9A gel cell batteries from Meshna (SP-294-19 at 2/$20), devise a power supply which, normally, always keeps the gel cells at full charge while supplying the computer and cassette recorder with pure DC for

glitch- free operation. A 12VDC to 120VAC converter could be included to run the Zenith monitor and 2040 printer during extended blackouts. The 108VA capacity of the two gel cells could run the whole works for over an hour, by candlelight.

But that could very well be: the subject of another, still unborn, article.

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Tell them where you saw it!

By Jack Goertz, P.E.

Making PC-DOS Easier -More Ways to Use Batch Files

and other useful tricks and tips

In my last article, I gave a brief overview of how you can use batch files to protect you from yourself and how you can use batch files to make your life somewhat easier. In this article, I'll concentrate on a special batch file and show you how you can use it to set up your working environment.

PC-DOS has recognized one particular batch file at system startup. This file automatically executes after your PC does its Power On Self Test (POST). This particular file must be named AUTOEXEC.BAT for DOS to recognize and execute it.

Before doing anything, issue a DIR AUTOEXEC.BAT command to see if your system already has such a file defined. If so, issue a TYPE AUTOEXEC.BAT command to list the contents of this file to the screen, or a PRINT AUTOEXEC.BAT command to print the file to your printer. Take a moment to look over the commands and see if you can tell what each command is doing. It's handy to have the DOS manual close by to lookup any strange commands.

AUTOEXECs can be used to set PATHs change your prompt, set your screen's colors, and even execute other batch files or command files. A typical AUTOEXEC may look like this:

```
ECHO OFF
PATH .;..;C:\DOS;C:\
TIME
DATE
PROMPT $p$g
SK
CLS
```

Let's look at each command and see what it does.

ECHO OFF-->This turns off the display so that you don't see each command as it executes.

PATH-->This defines the PATH to the DOS environment so that DOS knows where to look for EXE and COM files. This particular PATH command tells DOS to look in the current directory, then the parent directory, then the DOS subdirectory on Drive C:, and last, to look at the root directory for any executable programs.

TIME & DATE-->display the time and date and gives you the opportunity to change them. If you have a clock installed, replace these with the commands necessary for DOS to read the clock chip (not necessary with an AT or AT-compatible).

PROMPT-->This command modifies the DOS PROMPT, (>) to display the current subdirectoy. I'll talk about other prompts later.

SK-->Install Sidekick into memory.

CLS-->Clear the screen and return to the prompt.

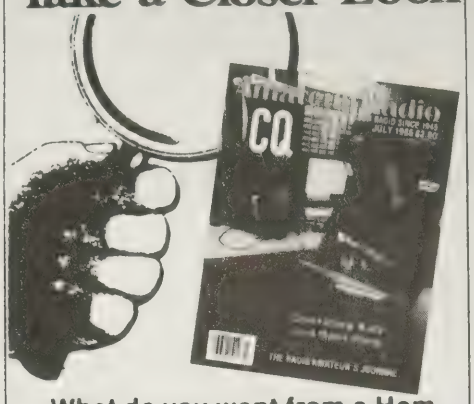
When you start your system, with this AUTOEXEC.BAT file in your root directory, each of these commands will execute, setting up your system the way you have defined it. If you have a menu, or another batch file, it can be executed by adding the program name as the last command.

Have you ever wanted to print your directory on your printer? Most of us have some time or another. Of course, you could issue a CTL-P or CTL-PrtSc before issuing the DIR command, then issuing another CTL-P or CTL-PrtSc after the command finishes. Or you could issue a DIR /P command, then use Shft-PrtSc to copy each screen as it displays. Or you could do it the easy way, straight from the DOS prompt, using one of the DOS pipes. DOS allows you to use "pipes to redirect the standard output/input of a command. The DOS piping symbol is the > to show "output to" or < to show "input from". To "pipe", or redirect, the output from the DIR command to a printer, issue this command at the C:>:

DIR > PRN

Your directory listing, and only your directory listing, will now go to the printer. You could have also directed the output to a file by using a file name instead of the device name, PRN. If you would like to append the listing to an existing file, use this command:

Take a Closer Look



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DIR >> fname.typ

where fname.typ is the name of an existing text file.

Pipes work for inputting data to the command or executable file, too. For example, you want to run a program that asks you to reset the same parameters everytime you run the program. After entering these parameters, the program calculates some values, prints a report, and exits. By putting all your responses in a data file and piping them to your program file, you can execute one command then go drink coffee until your report is printed. Here's how to do it:

(1). Run your program and write down all the inputs that's required. Be sure you include all the carriage returns because they are input, too.

(2). Create a data file with the responses in it. This is one time when it is easier to create a data file from DOS, rather than from EDLIN or WordStar.™ Name this data file something like MYANSRS (my answers, get it?).

(3). From DOS, input the command to execute the program, followed by the pipe command to get the input from MYANSRS rather than the keyboard.

For example, let's suppose your program was called DOIT.EXE, and you've stored all your responses in MYANSRS. To run DOIT, without any human intervention, issue this command string:

C:>DOIT<MYANSRS

DOIT will look to the file MYANSRS to get all the input it needs to run the program. Of course, you could simply this even further by creating a batch file that contains this command, then executing just the batch file.

If you don't know how to create a file from the keyboard, without an editor, follow these steps:

From the DOS prompt, enter this command:

C:>COPY CON: MYANSRS

Now key in the parameters, exactly as you entered them in your program DOIT. Be careful to enter carriage returns only where you did before. If you entered a character and the program took off and went to the next question, don't enter a carriage return. Just enter your responses one right after another without any spaces. To finish the file, enter <F6> (Function Key 6 on an IBM PC) or a CTL-Z, followed by a carriage return. Make sure you have enough responses in your file MYANSRS to answer all the questions asked by DOIT, otherwise your computer will hang up and you will have to reboot. You can use this method to create any file directly from the console, but be careful. You can't back up and edit it! The only way to modify it is with a word processor or line editor!

I'd like to do a column about your favorite DOS batch files, including commands in your AUTOEXEC file. Please send me a listing of your file, to the address below, with a brief explanation as to what's happening on each line. If I get enough responses, I'll prepare the column and share your wit and wisdom with all the readers.

'Til next time!

Jack L. Goertz, PE
Route 19, Box 248
Birmingham, AL 35244
CTM

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Tell them where you saw it!

Louisiana Amateur Packet Radio Society

Box 40723 Baton Rouge, La. 70835

July 16, 1987

Lambert Publishing House
1704 Sam Drive
Birmingham, AL 35235

Dear Chet:

The **Louisiana Amateur Packet Radio Society (LAPRS)** is pleased to be able to affiliate our organization with your magazine pursuant to the offer you made at Atlanta (Hamfest). That is, $___ per year, per subscription for club members.

Attached is a list of members of LAPRS who are entitled to receive **CTM** at this time. I would appreciate it if you would (could) begin their subscriptions with the current month edition. This will give them an even 6-months of your publication with renewals due again in January, 1988. Also attached is our check in the amount of $_____ to cover those subscriptions.

Also enclosed is a sheet of our stationary bearing the associations's logo. You can use this for the LAPRS newsletter page. Tom Palko, WB5ASD, (address attached) will be the editor of the newsletter and will be contacting you later.

In the meantime, if it isn't too late for the August edition, perhaps you could insert a small note telling LAPRS members that we have associated with **CTM** and that they can look forward to reliable newsletters from the Society in the future.

Sincerely,
Jack Coffee, WS5X
Secty/Treas

Jack and all LAPRS members,

WELCOME to the **CTM FAMILY!**

AFTER a little while, that welcome will become very clear. Our other **CTM** family members are smiling as they read this.

Not only will you be getting your newsletter on a regular basis, you will be getting other packet articles from the best packet writers in the country, plus, other ham articles, plus, computer articles you will find most enjoyable. You will soon realize how wise you were to affiliate with **CTM magazine.**

It is my sincere hope that other organizations which use to belong to *PRM (Packet Radio Magazine)* will join you in your "smart move".

I am also looking forward to the association with MARDA (Mississippi Amateur Radio Digital Assn) and ALA-NET (Alabama Packet Radio Association) soon. It would be great if all of the organizations would join you in your wisdom.

Regardless, I am most confident you will be pleased with your move. Chet

(If other STATE organizations are interested in joining the **CTM family** please contact me)

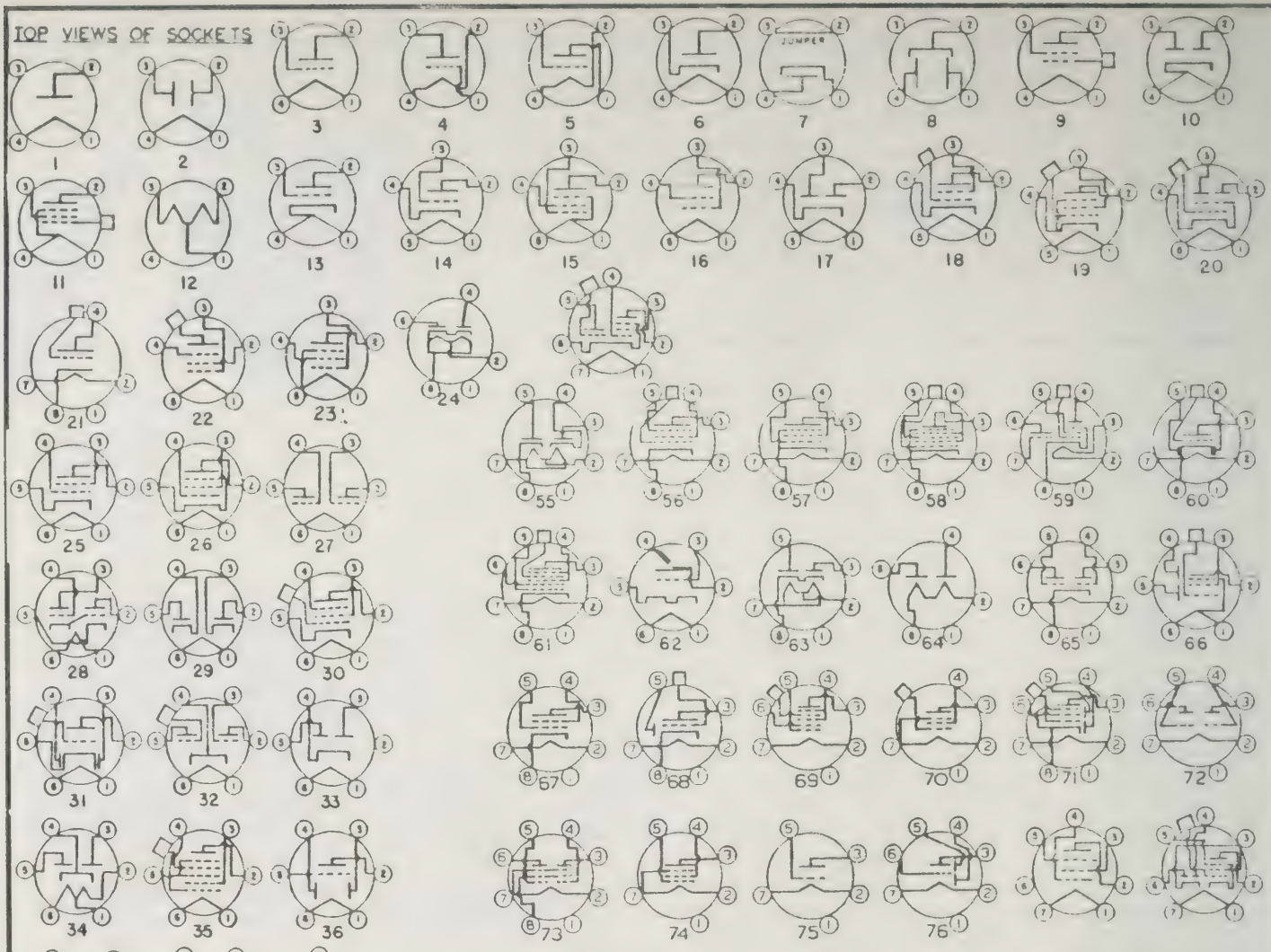


FIG. 2 (above and on opposite page). This chart contains the schematic diagrams and socket terminal connections *as viewed from the tops of the sockets* for the tubes listed in Fig. 3. Aligning key for octal tubes is always between pins 1 and 8; pin 1 is generally the metal envelope.

Tube	Base	Tube	Base	Tube	Base	Tube	Base	Tube	Base	Tube	Base	Tube	Base	Tube	Base
00	3	2B6	49	6B5	62	6X5	33	25Z6	65	49	16	78	30	402-403	3
00A	3	2B7	44	6B6	42	6X5V	33	26	3	50	3	79	32	450	3
01	3	2B8S	44	6B7	48	6Z3	6	27	14	1H250	6	80	2	482A	3
01A	3	G2-G2S	15	6B8	21	6Z4-84	17	K27	14	50	18	80M	2	482B	3
01AA	3	2Z2-G84	1	6B8G	21	6Z5-12Z3	34	27HM	14	51S	18	81	1	483	3
01B	3	G4-G4S	17	6B8MG	21	10	3	27S	14	52	16	81M	1	484	14
1	6	KR5	15	6F6	57	WD11	5	A28	3	53	42	82	2	485	14
KR1	6	5W4	64	6F6G	57	WX12	3	KR28	17	55	31	83	2	585	3
RA1	3	5Y3	24	6F6MG	57	12A	3	29	37	55S	31	83V	10	586	3
RE1	2	5Z3	2	6F7	45	12A5	46	30	3	56	14	84	17	840	22
PE2	1	5Z4	24	6F7S	45	12A7	50	A30	3	56A	14	G 84	1	1986	17
201	3	5Z4MG	24	6G5	62	12Z3	6	31	3	56AS	14	85	31	864	3
202	3	6A3	3	6H6	55	12Z5	51	KR31	6	56S	14	85AS	31	950	15
1A4	9	6A4-LA	15	6H6G	55	12Z5-6Z5	34	32	9	57	30	85S	31	951	9
1A6	35	6A6	42	6H6MG	55	14	18	A32	3	57A	30	88	2	985	17
1B4-951	9	6A7	43	6J7	56	14Z3	6	33	23	57AS	30	89	30	988	2
1B5-25S	31	6A7S	43	6J7G	56	15	19	34	11	57S	30	90	37	AD	6
1C6	35	6A8	61	6J7MG	56	17	14	36-51	18	58	30	92	37	AF	2
1C7G	69	6A8G	61	6K7	56	18	26	35S-51S	18	58A	30	95	28	AG	2
1D5G	70	6A8MG	61	6K7G	56	19	27	36-36A	18	58AS	30	96	6	AK	8
1D7G	68	6B5	28	6K7MG	56	20	3	37-37A	14	58S	30	KR08	17	B	4
1E5G	70	6B6	40	6L5G	39	KR20	37	38-38A	19	59	41	V99	4	BA	8
1E7G	73	6B7	44	6L6	67	22	9	39-44	19	59B	52	X99	3	BH	8
1F4	23	6B7S	44	6L7	58	A22	3	39A-44A	19	64-84A	18	181	3	BR	7
1F5G	74	6B8	71	6L7G	58	A-P22	18	40	3	65-65A	18	182A	3	D-1-3	1
1F6	68	6C5	39	6L7MG	58	KR22	37	A40	3	67-67A	14	182B	3	DI	2
1H4G	75	6C5G	39	6N5	62	K24	18	41	26	68-68A	18	183	3	DE1	14
1H6G	76	6C5MG	39	6N7	65	24A	18	42	26	69	37	213	2	E	3
1J6G	72	6C6	30	6P7	59	24S	18	43	26	70	37	216	1	G	3
1V	6	6C7	47	6Q6G	68	25-25S	36	44	19	71	3	257	15	GA	15
2A3	3	6D5	39	6Q7	60	KR25	26	45	3	71A	3	264	3	H	3
2A3H	13	6D5G	39	6Q7MG	60	25A6	57	45A	3	71B	31	291	20	LA	15
2A5	26	6D5MG	39	6R7	60	25A6MG	57	46	16	75	31	293	20	PZ	15
2A6	31	6D6	30	6S7G	56	25Y5	29	47	15	75S	31	295	20	PZH	26
2A7	43	6D7	48	6X5	63	25Z3	6	48	25	76	14	401	3	Wunder-lich	37
2A7S	47	6D8G	61	6X5MG	63	25Z5	29	A48	3	77	30	402	3		

Some may find this information useful. Thanks to Gene Corn, 3 Barton St. Greenville, SC 29609

Tell them where you saw it!

By Robert S. Hoover, KA6HZF

A Review

The Weltec 1202

A Neat Little Modem At A Nice Little Price

Are you into Packet? Then you should have a telephone modem, too.

Are you a computerist who uses the local BBS? Then you'll enjoy Packet Radio...

It's a big surprise to many hams when they discover Packet Radio -- the hottest thing to come down the radio pike since coax -- is an off-shoot of digital communications via telephone, well matured procedures which have been around for over half a century.

There are many obvious differences between Packet and using a telephone modem; I'm not trying to say they're the same, I'm pointing out they are *related*. And if you've found Packet useful -- and it's hard not to -- you're going to find a modem equally valuable; possibly even more as Packet-only frequencies become saturated.

Modem Basics

"Modem" is derived from the words "modulator/demodulator". You can't send digital pulses over a telephone line, the distributed capacitance and inductance of the line quickly soaks up the clean-edge pulse, and audio-grade line amplifiers go nuts trying to deal with the on/off bullets of digital

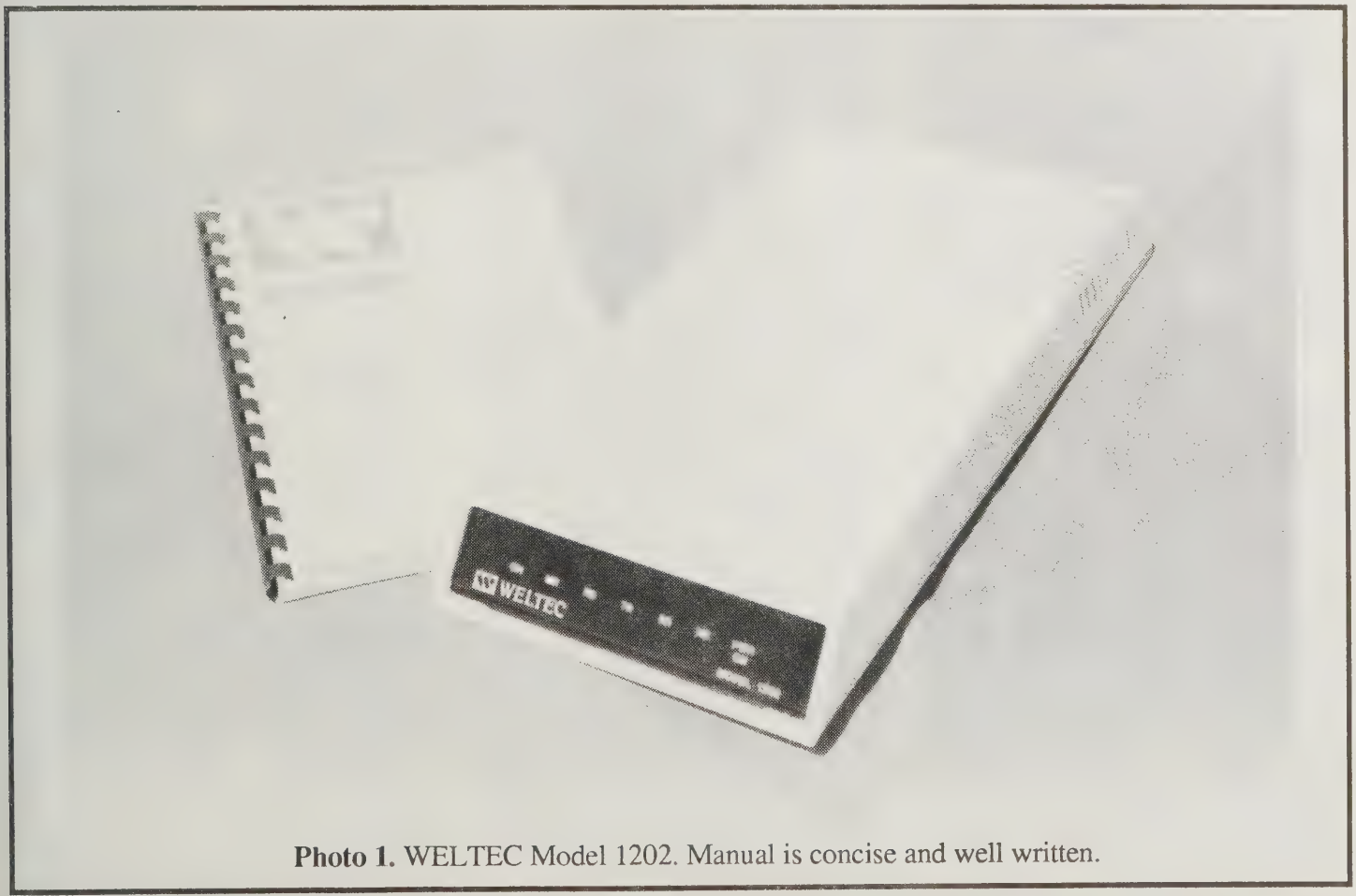


Photo 1. WELTEC Model 1202. Manual is concise and well written.

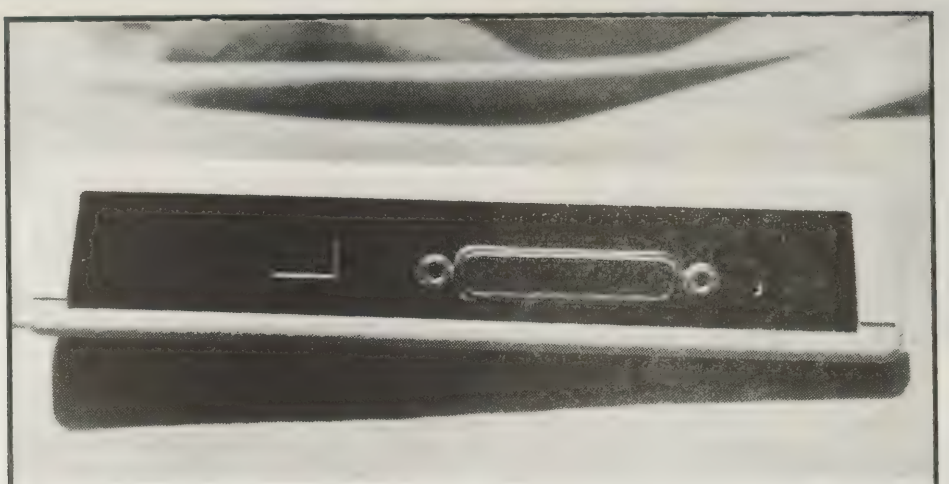


Photo 2. Rear panel -- nothing very difficult here. Modular phone jack, DB-25s socket for RS-232c cable to your computer, and 2.5mm coaxial jack for power from the wall transformer (supplied).

communication. Moving data over the ubiquitous twisted pair calls for changing the digital pulses into voice-like tones. The modem is the thing that converts the pulses into tones -- it 'modulates' the signal. On the receiving end it listens to the tones -- there are usually two of them -- and 'demodulates' the tone back into a pulse.

The earliest modems (in the 1920's!) did only that; create tones. All of the other chores -- timing, switching, and so on -- was done either by the operator(!) or by circuitry aside from the modem itself. Speed, as measured in Bauds (ie., alternations of the signal per unit of time) was relatively slow by modern standards but transmitting your data via telephone -- usually read from IBM punched-cards or punched paper tape -- was still faster than the U.S. Mail.

One of the first -- and the best -- manufacturers of modern modems is Hayes Microcomputer Products, Inc. (705 Westech Drive, Norcross, Georgia 30092, tel (404) 449-8791). Hayes rose to the top of the heap by making their modems 'smarter' than the competition, using either the host computer or, as in later designs, a dedicated microprocessor on-board the modem itself to handle all of the switching and timing chores. They called it the Hayes 'Smartmodem' and it certainly was! Hayes remains the over-all leader in the field today and changes top-dollar for their modems.

When Hayes made modems smarter, they had to create a language so you could talk to your modem: to tell it what to do. In the 1950's we had to flip a lot of switches and insert jacks into a plug-board; with modern modems we simply type in our commands from the keyboard and the on-board microprocessor configures the modem for us.

The Hayes modem 'language' or command set has also become a *de facto* standard for the industry; if you build a modem it had better be "hayes compatible" or a lot of software will simply refuse to work with your modem. (Sound familiar?)

To make modems even easier to use there are numerous 'Terminal Programs', suites of software that run on your computer and act as an intermediary between your system and the modem. Want to send a file to someone? Just tell your terminal program. It locates the file, sends the proper configuring sequence to the modem -- using Hayes compatible commands -- dials the phone, connects to the distant computer, and then feeds the file to the modem for transmission. And it works both ways. With the better terminal programs you don't even have to be there, you can instruct the program to call a distant system during low-rate hours -- and to keep calling until it connects -- and to then transmit or receive a specific file or string of files.

(Bob Slaughter has been doing a very good job with his series of articles on *using* modems - perhaps we could get him to give us some dope on various terminal programs as well.)

Error trapping on modems is still quite primitive, much less reliable than with packet, but this is changing rapidly as people come up with various networking schemes, insuring what is sent matches what's received -- just as you do in packet. (I'll have more to say on this later.)

You Get What You Pay For

With a price range from under $50 to over $500 it's plain to see not all modems are the same.

The Hayes 'Smartmodem', or other top-of-the-line modems, include additional filters and circuitry to insure reliable performance under adverse conditions. The cabinet of a hi-buck modem is liable to be an RF-tight die-cast box, and most premium modems are *individually* tested and burned-in -- always an expensive procedure. (It often takes more man-hours to test and package an electronic device than to build the thing.)

If you're in the Australian outback, trying to send data over 200 miles of barbed wire fence, you're going to need a premium-priced modem. (Interestingly enough, this isn't a joke -- some top-of-the-line units are so good you probably *could* use barbed wire... but not that much of it.)

On the other end of the scale you'll find some obvious rip-offs, pieces of junk which fail to work reliably even under optimum conditions. Outfits building junk like this never last very long but it seems there's always another one to take their place -- and a ready line of unwary customers.

The middle-ground, somewhere between the NASA-esque quality of the Hayes and 'parts-in-a-baggy' junk, offers some excellent values for the careful buyer -- rigs which give outstanding performance over a wide range of telephone line quality -- and which are Hayes-command compatible,

Tell them where you saw IT!

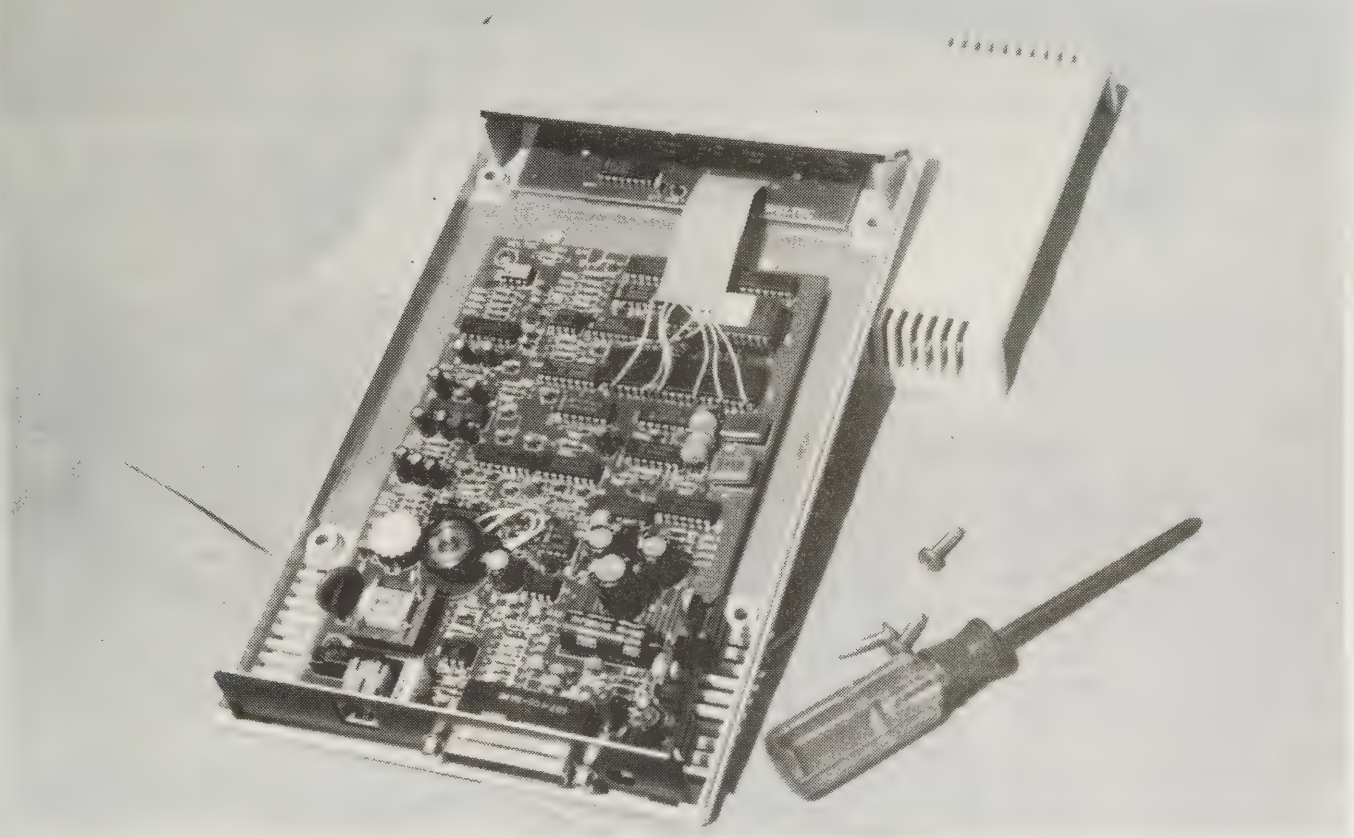


Photo 3. Layout (computer-plotted) is neat and unclattered. Note volume control pot, transformer, speaker and MOV.

yet won't cost you an arm and a leg. And notice I said 'values' instead of bargains -- a good modem commands a fair price; if you shop by price alone, chances are, you're going to wind up with junk.

The WELTEC Model 1202

One of the better rigs is the Weltec 1202 (WELTEC Digital Inc., 17875 Sky Park North, Suite 'P', Irvine, California 92714, Tel (714) 250-1959). It's made in the USA from an American design, and offers excellent performance for a reasonable price.

I got the modem from Quest Technologies, Inc. (16210 U.S. 19, Hudson, Florida 33526, Tel. (813) 869-1330), for $119. It arrived via UPS -- very nicely packed, too -- in less than a week. It came with the manual, wall transformer, and a telephone cord with male modular plugs on either end.

The 1202, as the model number implies, will operate at 1200 baud. You *can* tell it to run at 300 baud but 1200 has become the *de facto* standard and is the default speed on the WELTEC. (A few years ago, when *any* modem was pretty hot stuff, 300 baud was considered to be a blinding speed -- 9600 baud modems are now available and I've seen demonstrations of systems swapping data at 19.2 kilobaud -- the scrawl is definitely on the wall)

Since the 1202 is an external-type modem -- 'internal' types plug into the motherboard, externals use your computers's RS-232 serial port -- it can be used with virtually any computer supporting an RS-232 interface. (And since some systems don't have accessory slots on their motherboard, you're forced to use an external type.) As you can see in the photos, it's a neatly designed package with a relatively small footprint -- it's happy to sit atop your monitor or may be tacked to the side of the console (with velcro, not tacks!) The WELTEC 1202 is a lightweight unit, an important consideration for emergency communicators. The case is injection-molded thermoplastic which derives its RF shielding from aluminized plastic barriers on the interior of the cabinet; the color is a very light creamy beige that closely matches the IBM.

"It's a Nice Looking Rig"

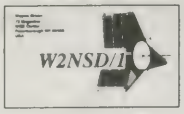
The front panel is a wedge-edge pane of smoked plastic through which a row of seven LEDs may be seen when lit, their function indicated by silk-screened labels on the plastic. An earlier version, the WELTEC 1200, lacked this feature but its specs -- as a modem -- are the same. (The LEDs tell you the state of the system but the more intelligent terminal programs give you the same information. I prefer the LEDs; I don't have sexy terminal programs for all of my computers.)

Here in the shop the modem's

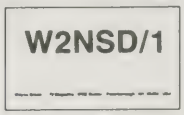
UNCLE WAYNE'S

BOOK SHELVES

Style W



Style X

Style Y 

Reverse

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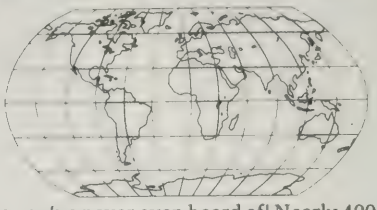

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Save yourself the humiliation of never having heard of McDonald Island (what's the prefix?), Jan Mayen (prefix?) or Kure Island (prefix?).

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Code Tapes

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"Genesis"

5 wpm-This is the beginning tape, taking you through the 26 letters, 10 numbers and necessary punctuation, complete with practice every step of the way. The ease of learning gives confidence even to the faint of heart.

"The Stickler"

6+ wpm-This is the practice tape for those who survived the 5 wpm tape, and it's also the tape for the Novice and Technician licenses. It is comprised of one solid hour of code. Characters are sent at 13 wpm and spaced at 5 wpm. Code groups are entirely random characters sent in groups of five—definitely not memorizable!

"Back Breaker"

13+ wpm-Code groups again, at a brisk 13+ wpm so you'll be really at ease when you sit down in front of a steely-eyed volunteer examiner who starts sending you plain language at only 13 per. You'll need this extra margin to overcome the sheer panic universal in most test situations. You've come this far, so don't get code shy now!

"Courageous"

20+ wpm-Congratulations! Okay, the challenge of code is what's gotten you this far, so don't quit now. Go for the Extra class license. We send the code faster than 20 per. It's like wearing lead weights on your feet when you run; you'll wonder why the examiner is sending so slowly!

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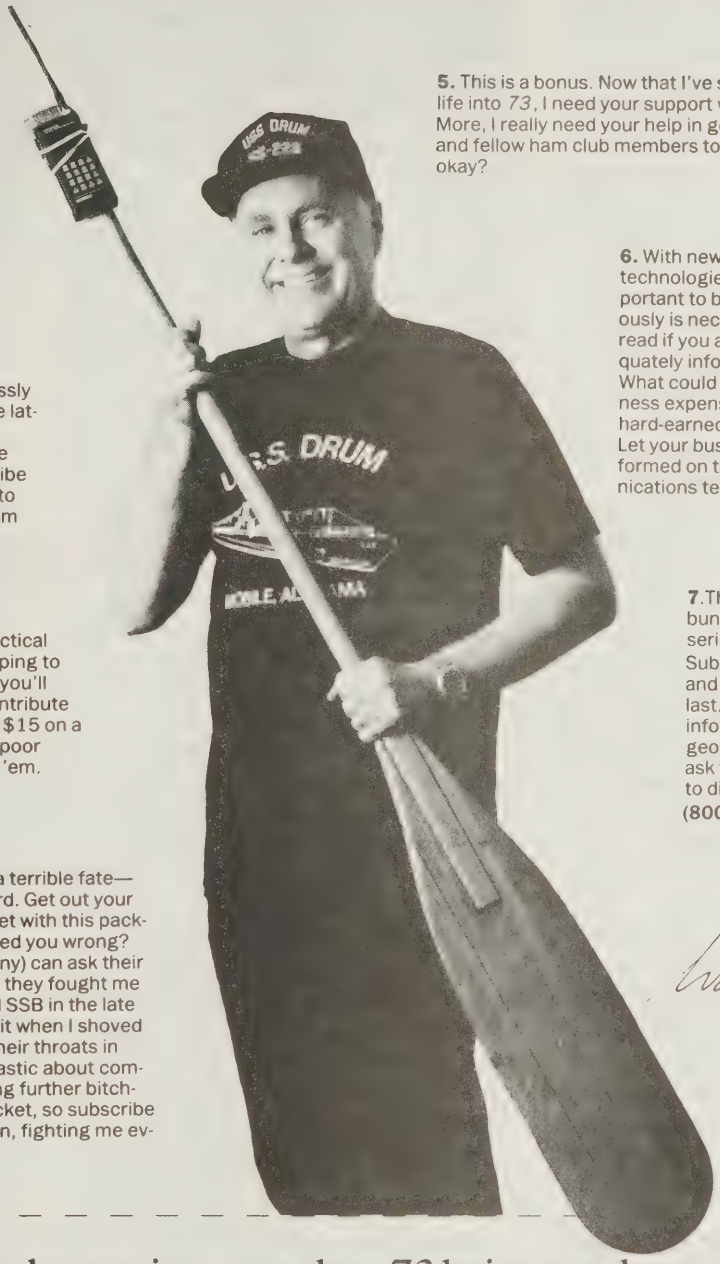

1. The League has long had a policy that you must subscribe to *QST* before you have a right to complain about the League. Why should *73* have any less lenient a policy? From now on, all you readers who are complaining about my editorials . . . subscribe first, then complain. It's my policy.

2. Do you sit there helplessly while your friends tear the latest *73* to bits over the air, frustrated because you've been too cheap to subscribe and *73* hasn't yet gotten to the newsstand or local ham store?

3. You know, it isn't as if I don't make it a practical financial decision for you. If you insist on helping to pay for your local newsstand owner's yacht, you'll shell out $35 a year for *73*. I'd rather you contribute to my dinghy fund at $20 and blow the extra $15 on a fur coat for the wife. Heck, at least bring the poor suffering woman some flowers . . . say I sent 'em.

4. *73* can save you from a terrible fate—being a known packet nerd. Get out your August issue again and get with this packet stuff. Hey, have I ever led you wrong? Youngsters (if there are any) can ask their grandfathers about when they fought me tooth and nail as I pushed SSB in the late '50s. Their fathers hated it when I shoved repeaters and FM down their throats in 1969. Then I got enthusiastic about computers in 1975, generating further bitching. Now I'm plugging packet, so subscribe and get on the bandwagon, fighting me every inch of the way.

5. This is a bonus. Now that I've started getting some life into *73*, I need your support with a subscription. More, I really need your help in getting your friends and fellow ham club members to subscribe. Talk it up, okay?

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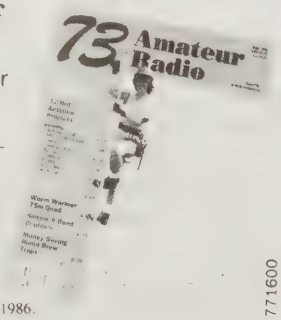

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771600

Continued from page 71

Here in the shop the modem's appearance evoked many comments -- "Matches the computer" (on an XT clone at the time), "Neat-looking", "Very nice" -- being typical; all were complimentary. It's a nice looking little rig.

Getting Acquainted

The wall transformer provides 9.5 volts of *ac* and the connector is the standard 2.5mm coaxial-type, so be sure not to get it confused with your HT wall-charger. I marked mine with a bold label; don't forget to mark **the connector,** too. The wall transformer is a "Class 2" unit; indoor use only and it would be wise to unplug it when it's not in use. (Remember all those wall transformers the phone companies used to power the dial light on Princess (and other) telephones? Remember how they sometimes caught fire? Remember how they had to replace them all? Good. No *you* remember to unplug the thing.) Mine has an annoying little hum, so quiet I didn't notice it until all of the equipment was shut down for the night. When I tracked it down I suddenly remembered about the phone company transformers. But so long as it runs cool -- mine does -- there's no reason to replace it.

The ac is brought into the rig through a sturdy pair of ferrite chokes and is rectified by four discrete diodes in a full-wave bridge configuration, a curious departure from the more typical monolithic bridge but a departure I heartily approve -- the four diodes will dissipate heat better than the typical block-rectifier and should they require repacement, individual diodes are more readily available than monolithic types.

Downstream from the rectifier is the usual filter cap, and a vertically mounted 7805 (5vdc regulator) in a T-220 package, selfsupporting, with a butterfly heat-sink attached.

The ac arrows down the board to another quad of rectifiers, this time producing the ± voltages for the RS-232 drivers, the old married couple, Mr. 1488 and Mrs. 1489. This told me what I needed to know to convert the thing to operate from a car battery; I'd have to use a little DC-DC converter, like the Astec 1259. I was rather hoping to find the new Maxim MAX232CPE chip in place of the MC1488/MC1489 combo but I suppose it's a bit too new. The Maxim chip needs only +5 to produce ± 9 volts for the RS-232 port, replacing the 1488 and 1489. This would simplify conversion for emergency use.

The circuit board is double-sided glas-epoxy -- top quality all the way. I like the circuit lay out -- very nice alignment and good spacing between components, allowing either machine or hand insertion.

Over on the telephone side of the board is the usual 600:600 transformer -- and not a small one, either. There's also a scarlet MOV lurking near-by, ready to pounce on any line-surges. It won't save you from a direct hit by lightning, but over the years it will trap a lot of trash which could otherwise put the board out of action.

Right beside the MOV is "SPK1" and "VR1", the noise makers. I turned VR1, the volume control for the speaker (SPK1) as low as it would go. If you have to change the volume setting frequently it would be wise to drill a small hole in the case so you can reach VR1 with a screwdriver. The case is assembled with for #8x3/4 Phillips-head sheet-metal screws and it would be tiresome -- and damaging to the case -- to dismantle it too often.

The board was wave-soldered and machine-sheared, as nice a piece of production work as I've seen in years. Save for one EPROM all of the chips -- there are 22 of them -- are soldered to the board; the EPROM is socketed. There were no patches nor 'fixes' (components tacked to the solder-side of the board), and the silk-screened component nomenclature and outlines were well placed, clearly printed and apparently done in eposy enamel -- no signs of pulling or smearing. The technician in me appreciates a board like this -- it would be easy to work on -- and the clean, computer-aided design/layout highlights the professional engineering that went into it.

The brains of the thing reside in a 40-pin Intel microprocessor whose number I didn't recognize -- I don't know very much about modems. I was happy to see the socketed EPROM parked alongside: that's where the program hangs out and the socket gives the board a certain *potential* flexibility, a minor hedge against obsolescence. If WELTEC comes up with a better control program than the ubiquitous Hayes command set -- or even an enhancement -- you can simply plug in the newer program. Odds are, this won't happen, but the potential is there.

Engineering-wise, you get a lot for your money with this modem. The people responsible, from design right through to shipping it out the door, can be proud of their efforts -- and probably are.

Hooking It Up

Installing the WELTEC 1202 is about as easy as picking daisys. Shut off the computer then connect the phone line to a wall-jack, insert the power lead -- after plugging in the wall transformer -- then plug in the RS-232 cable. Mine came with a 4' phone lead but no RS-232 cable; WELTEC will sell you one but they're easy enough to make up... if you have a pair of DB-25p connectors. That's the male plug; DB-25s is the female. You need a pair of male connectors and a couple of feet of 3-conductor cable.

Don't make the connecting cable too long, it'll pick up noise; you should use shielded cable if you've got it but you can get by without for a short run.

Only pins 2, 3, and 7 are needed, the classic three-wire system consisting of data in, data out and the common ground. (Pin 7 is the ground but the designation for pins 2 and 3 depends on what kind of a device you are; whether you're the modem or the computer. For our purpose just connect them direct, pin 2 to 2, 3 to 3, and 7 to 7.)

Tell them where you saw IT!

This much detail on the RS-232 cable might seem like over-kill but if you get the moden **without** the cable -- and can't come up with the right connectors -- it could be a frustrating experience. Best Bet? Either order them together or make sure you have a cable on-hand before the unit arrives. (The WELTEC part number for the cable is 140.0009)

There's no power switch on the unit; when you plug it in the "PWR ON" LED lights up and that's it. "HS" (ie., High Speed) will also light, indicating the rig is ready to go at 1200 baud; you can change that by changing one of the parameters.

Waking It Up

To talk to the thing I loaded a terminal program and went to Terminal Mode. To test the connections I typed "AT", the standard Hayes-command code for "Attention". The modem responded with "OK", telling me it could hear and understand characters coming from the computer.

The WELTEC comes with a 30 page instruction manual; you'll have no trouble doing just what I did, and the manual explains *why* you need to do certain things as well. I won't go into a lot of detail on these points since to do so would only duplicate the manual, which is well written; if you buy one of these rigs, you won't have any trouble putting it to work.

Once the 1202 was speaking to the computer I had to know if it would work as a modem. To check it out I called a local BBS -- there are hundreds in Southern California -- and waited for the 1202 to tell me it was "CONNECTED". But it didn't.

You can hear the whole routine of dialing, connecting and so on; there's a tiny speaker (SPK1) in the 1202 that stays on until the computer-to-computer connection is made. I could hear the thing dialing and hear the tones from the other computer, but apparently the 1202 could not, even though it was playing the sounds out through its own speaker.

Since there are no adjustments to play with on a modern modem -- except the speaker volume -- any incompatability between your modem and the system it's trying to connect to is 'dialed-out' by changing one or more of the configuration sittings. You do this by calling up the command you want to change, entering a new value, and hitting RETURN -- it's exactly the same procedure as for changing a parameter on a Packet TNC, except the modem uses Hayes-commands and your TNC uses the TAPR codes. One nice thing; a modem only has a few parameters -- duck soup compared to setting up a TNC.

I knew the other computer was generating a tone -- I could hear it clearly -- and since the demodulator in the WELTEC is crystal-controlled there was little chance it was off frequency. This narrowed it down to a timing problem; probably the width of the 'window' during which the WELTEC sampled the other computer's tones. If the window were too narrow, the demodulator would fail to lock-on.

There are 17 command registers, **S0** through **S16; S9** sets the Carrier-Detect window, accepting a value between 1 and 255 to set the timing in .1 seconds increments, that is, the window can be from .1 second to 25.5 seconds wide. The default value -- the value that's already encoded in the modem when you turn it on -- was 006; six-tenths of a second. I changed the value to 010, making the window 1 second wide, and the modem immediately locked onto the other computer's signal.

When the modem detects the other system's signal, it flashes "CONNECT" on the screen and shuts off the internal speaker (you can tell it to leave the speaker on if you wish). From that moment you're on-line to the other system and if you're talking to a BBS, the sign-on message immediately flashes onto the screen. 1200 baud moves a lot of data in a hurry; certainly faster than my 300 baud terminal program for the VIC.

Putting It To Work

Several excellent articles on *using* your modem have already appeared in the pages of **CTM** (*modemMail* (A Review), Glen Popiel, WA4FTX, June 1986, pg. 29; *The Bulletin Board Bonanza,* Herman Holtz, June 1986, pg 40; *Remote Bulletin Board Service, Part I,* Bob Slaughter, May, 1987, pg. 14; *Remote Bulletin Board Service ,Part II,* Bob Slaughter, Jun/Jly, 1987, pg. 51) so I won't beat a dead horse. I worte this article because I found the WELTEC to be a fine piece of equipment and wanted you to know about it. You can pay more for the same performance, and you can buy better-performing modems -- at a higher price, but you'll find it hard to beat the *value* this device represents.

Going Faster

Modem and Packet technology are forming a symbiotic relationship, advances in one field quickly appearing in the other. Some of the error trapping techniques common to Packet have been successfully transplanted on to low-cost Local Area Networks (ie., modems and wire vs TNCs and radio). At the same time, various techniques of out-witting the telephone systems physical limitations have produced quantum increases in transmission rate -- 4800 baud is now comfortable on lines once spec'd for only 300 baud -- and so on.

If you're new to modems it might appear the field is in a constant state of change -- new things popping up everywhere you look. This is largely true but by keeping your eye on the trees, you've lost sight of the forest. Modems -- fast or slow, smart or dumb -- give you *access* to an incredible assortment of information, expand your time, and improve your ability to communicate. The modem is only the device; its value is in what it can do, not how well it does it -- and speed is an entirely different subject.

I suspect you'll have a natural tendency to sort of hang back, waiting for the field to shake itself out; waiting for a $50 modem that will handle 9600 baud. *Don't do it.* I suggest you look into the subject

now, pick up a modem -- new or used -- and learn how things work. *Then* you'll be able to make a better decision; to wait for perfection, or get some use out of the thing *now*. (obviously, I've jumped in with both feet, but I don't want to preach at you. I've foundtelecommunicationsextremely valuable and so *may* you.)

A Closing Note

This didn't start out as a product review, I needed a modem, checked around, and settled on the WELTEC. I found it to be a good piece of gear, something I thought you'd like to hear about. I talked it over with Chet -- I own him half a dozen other articles and something would have to get pushed back if I wrote about the modem -- but he said give it a go, asking only that I include some basic information about modems in general. I blocked out the article (knowing Chet would throw out some of the best stuff-like the part about the TLC549IC chip) then called WELTEC to nail down the details. One of those details was to find out where the thing was made; the label on the bottom didn't say where it was built. Where once virtually all imported electronic gear came from Japan, now you need a world atlas to figure out where our money ends up. Without a name on the label I couldn't tell if the thing came from Taiwan or Timbuktu.

WELTEC's Jim Lobeck was laughing at me when he answered, "Actually, we make it right here in ***America,*** on an Indian Reservation up in Montana."

Hearing that was like money from home... and in a way, maybe it is.

Robert S. Hoover, KA6HZF
1875 Monte Vista Drive
Vista, California 92084 **CTM**

(I just had to check this out and see if Bob was kidding or not but he's right. The Weltec is put together by West Engineering on the Fort Peck Indian Reservation at Poplar, Montana, right here in the U. S. A. If we've got any **CTM** readers up that way I'd surely like to hear more about it. Chet)

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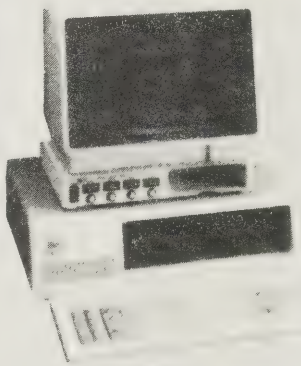

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Tell them where you saw IT!

By Jim Norton

Programs, Piracy,& Protection

Once upon a time, a long long time ago....

Well in years it wasn't all that long ago. But counting by the developments of computers it was at the dawning of history.

When the dinosaurs of computers that existed in the research labs spawned a more reasonable sized machine and they moved into the colleges and businesses of the country, each site had it's own computer area and developed its own software. Each one was a specialized center, devoting the time of the computer and the support team to a limited number of tasks.

In 1964 I wanted to study computers. The reason I didn't was that the school I wanted to attend only taught a specific business application, banking. That was the only facility teaching anything about computers at night in my area as far as I know.

Eventually, the computer spawned smaller and smaller brethren until they escaped from the computer area where they had been confined and found refuge in homes and on desks across the country. In fact a whole species of recreational electronics have come from the laboratories to the home. Computers are probably surpassed in the number of homes they infest only by TV's, stereos and video games.

Once individuals started to have computers in the home the number of any particular model that was produced increased many times. It started with a few companies selling kits and was soon followed by companies selling ready to run computers. Soon there were hundreds instead of dozens of computers spread around the country. And with them developed the hacker (in the original meaning-modems were generally not available at this time) spending long hours in the night experimenting with the new machines. The trickle of programs started to increase, not to a flood yet, but it was the start of modern computing as we know it today.

At first when computer people gathered to talk shop, a person who had developed a new program, or just a new routine to be used in a program, would pass it on to all who were there. This is one of the reasons the micro/-personal/home computer developed as it did. If all the advances had come from the colleges and business research, our personal computer would probable still be small enough to fit inside a box car, maybe. Yes, I know the computers are made by the big companies. However, the market it fueled by software. And that is what we are really talking about.

In the beginning there was a comradery that has since disappeared. Most everyone just wanted to see what could be accomplished. No one seemed to even consider the idea of trying to get rich from the personal computer market. When software was sold, it usually was for a nominal amount. This was the time when there might not be a dozen computers of the same kind in any one area.

Part of the reason was not alterestic. There was simply not enough demand for a piece of software. Even then it cost a nice piece of change to advertise in a national magazine. And who would want to spend five hundred dollars to advertise a program when it might produce a dozen orders, tops. There just wasn't a market at this time.

Progress waits for no one however. Almost over night we went from a situation where almost all the people who had a computer knew enough to write their own operating system, if need be, to where there were thousands of people who owned a computer and didn't even know how to program in a higher language. Along the way the software segment changed

to meet the meeds of a new set of circumstances.

The computer market probably could be divided into three segments, each with its own needs. The first is the computers used mostly for business. These are mostly the PC and PC clones. The second is the computers that are used mostly for playing games. While many people are using them in productive applications, by shear numbers of machines used to play games and software game packages sold, they can be called game machines. Most of these are the Commodore and Atari machines and generally belong to a younger group. The third group is (are you ready for this?) the Commodore and Atari 8 bit machines but also includes the Apple computers. In this group people from young to old use their computers for anything you can think of. Mostly they use them for a combination of things from word processing to game playing. While they would not think of doing a letter on anything but their computer, they wouldn't be embarrassed to be caught playing a game on it either.

Each of these three diverse groups have their own requirements. Lets look at each one separately.

In the business group the software prices have been high and just now show signs of becoming reasonable. The business computer didn't really make much of an inroad until the introduction of the IBM PC which set a standard. And with the PC clones proliferating and the prices dropping through the floor, more and more are finding their way into the home environment.

Part of the justification for pricing business software at a rather high price was that it was going to be used to make money. Also, when a business is footing the bill it doesn't seem to hurt as much as when you must write the check out of your personal account. The industry leaders in this category also provide support, usually by a technical support division you can call with any problems you have. And let us admit it, most businesses are as guilty as anyone else about piracy. A company may have two, three, five or more machines, but very rarely will they buy more that one copy of a program.

The business community has never had to contend with protected programs to any serious extent. The need to have a back up copy ready in case it was needed was cited at first, and then the almost universal use of a hard disk made copy protection almost non-existent. Most businesses won't even consider a copy protected program.

One case in recent history will give an example of what happens when a program that is the industry standard switches to copy protection. AUTO-CAD by Auto Desk is the recognized leader in CAD software. In the latter part od '86 they released a new version with many improvements. Even they didn't try the old trick where you must have the master copy in the "A" drive to boot the system. They developed a system where you had to have a "hardware lock (dongle)" on the RS- 232 port to use it. It took only a few months for a company to come out with a program that would let you run AUTO-CAD with the hardware lock. Almost immediately Auto Desk released a new version that didn't require the hardware lock to run.

Prices have generally stayed up for business software except for the offerings of Borland. My personal opinion is that they are banking on the move of the PC/MS DOS machines into the home and are pricing to pick up that market.

The game players had a choice of about half a dozen good machines just a couple of years ago. Now there are only two that fits my criteria for a game system. The Commodore 64 and the Atari 8 bit machines, and of these only the Commodore is really supported by new software to any great extent.

Almost from the first all the programs for the game machines were copy protected. And almost all copy protection is by doing something tricky on the disk. A few along the way came with dongles, but not many.

These machines also attracted a group of people who had, or developed, a fairly advance technical ability. Many programs were stripped of copy protection and then passed on, to be copied by any method. Some would study the way the copy protection was implemented on the disk and then write a program that would copy it. The better copy programs regularly come out with updates that will copy programs that use new copy protection methods. The software houses that develop new and better copy protection assure a prosperous future for the copy program group.

The prices of this group is so close to the next group that I will discuss then all together at the end of the next section.

The last group is the people who have machines that possess the capabilities to be a good game machine but is used for other things most of the time. A friend of mine has two 64s and one 128 at his business. One of the 64s is dedicated to writing checks and the 128 keeps records of every other aspect of his business. He also has two 64 systems and a 128 system at home. He has one of the nicest software game libraries I have seen. And he has been known to load a game or two at work, too.

These people have had to endure the burden of software protection also. Not just on the games either, all programs. Games, spreadsheets, data bases, word processors, telecommunaction programs, you name it and it is almost certainly copy protected.

Not having the large base of business users who need to have a backup on hand in case of failure nor hard disks these users have accepted copy protection as something that just had to be endured. In fact, I feel that the development of a hard disk system for these machines was delayed in part because of the lack of programs that would run on them. After all, what good is a hard drive if you have to put the original disk in the floppy drive so the program can check for errors?

However these users did get something for their pain. Because of the extremely large user base the

Tell them where you saw IT!

price competition has caused the programs for these computers to be less than those for others. After all when you get a base of five million Commodore 64 computers out there, there is a really large market to be tapped.

In fact almost all computer users owe a debt of gratitude to the mass market merchandising that put so many computers in so many homes. With the price wars causing the price of a computer to fall to less than $300.00, (Commodore 64s have ben seen on closeout for $99.00) no one wanted to pay $150.00, for example, for one program. Software just wouldn't sell to these computer owners at those prices. It was only after some of the developers realized that a hundred thousand sales at thirty dollars could generate more profit than a hundred sales at a hundred fifty dollars that the prices started to fall. As a result, the same program, that does the same things, cost more for some computers. An example is Print Shop. It is advertised for around ten dollars less for a Commodore 64 than a PC/MS DOS computer. As far as I can tell it is exactly the same program, just more expensive for the PC/MS DOS machines. But it is not as expensive as it would have been without the mass market machines that created a low price market.

Distributors who use copy protection schemes feel that to remove the copy protection for programs, especially games, would reduce their profits to a considerable degree. At least now it takes a little time for the copy protection people to put out a program to copy their program. Some distributors are selling programs at two different prices. One for a copy protected program, and a larger price for a non-copy protected program.

Distributors must make a profit if they are to stay in business. There is no arguments about that. What is often cited is the amount of gross profit made on each sale. The best instructions and a disk can't but a small percentage of what a program sells for. A game that sells for $ 25.00 to $ 35.00 can bring the distributor $ 10.00 per sale. A program that sells for $500. on the other hand can bring them $ 300.00 a sale.

The bottom line? It is still a problem that each of you will have to make your decision about. I no longer have any Commodore equipment, so I don't have the copy protection / back-up cycle problem. I try not to spend my money on copy protected programs. In fact, FASTBACK is the only copy protected program I have.

Jim Norton
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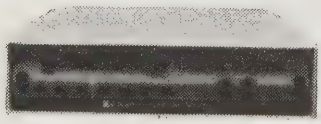

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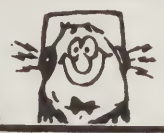

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By Doug Hoiles

Don't Modify Your Equipment Build a Power Supply Switch Panel

In **CTM** and other magazines I occassionally see an article telling how to modify some piece of equipment to add an on/off switch. John O. Ezike's recent article on modifying the T/S 2040 printer is an example and I am sure that what he suggests would work just fine.

However, I feel that there is an easier way which also helps solve wiring clutter problems for those of you that have a lot of separate pieces of equipment, some of which you only use occassionally. This applies to all brands of computers, ham radio gear or whatever and can even be helpful if all your equipment already has main power switches.

The solution is to build a conveniently located line power switch panel with a separate switch for each separately powered piece of equipment. The switches are wired to an equal number of standard power outlets mounted on a separate panel into which you plug your devices. You then do all of your on/off switching from the panel only. Not only does this reduce the clutter of wires all over the place, and solves the problem of how to switch on and off things where the manufacturer was so sure that you would never want to turn his marvelous device off that he omitted the switch, but it also can make operations somewhat easier and perhaps even safer in some cases. It has the added benefit that low voltage, plug-in DC power supplies are disconnected from the line when not in use, a safety feature which can help reduce premature power supply failure.

The following is simply a suggested approach to the concept. While it should work exactly as suggested, you will probably want to modify it to your particular circumstances or needs.

The figure shows a schematic for four devices, but it may be extended to any number as long as you watch the total current draw on your main line. Keep it to 15 amps maximum for any one power outlet CIRCUIT (i.e., see what else in the house runs off the same fuse or breaker in your house power panel)! For the one line coming from the wall outlet to your first master protection switch I would suggest heavy duty appliance cord from a hardware store. Or you could use the cord, switch, fuse and circuitry from a spike/surge protected plug strip. This also usually gives you the first 6 power sockets that you will need. If your plug strip does not use a double-pole switch (and it probably doesn't), throw it away and buy one. For best line protection you should isolate both leads from your equipment when not in use.

Start by counting the total number of devices you have that plug into 120 volts, even if you don't plug them in very often. Add at least four for future expansion. Buy that many single pole, single throw switches and, after subtracting the number of sockets in the plug strip, buy HALF that many standard duplex outlets since each one counts as two after you break off the connecting tab on the hot side. The switches may be standard household type light switches (the two in one kind that are covered with a regular duplex outlet cover save space, but are rather expensive) or any other type of 120VAC SPST switch from Radio Shack or wherever. Consider total panel space and mounting problems when deciding.

Next, lay out a switch panel that you can attach solidly to something within arms reach of where you normally sit. Mount all switches in this panel including the master DPST switch. Next, make a panel or bracket which will mount in an out-of-the-way location and mount all of the power outlets in it. You could use the back and/or side panel(s) of the switch box if you use a box and if it has enough room. Allow enough spacing so that bulky, low voltage power supplies do not block access to other outlets. Be sure to put a safety cover over the wiring side unless you mount it someplace where accidentally touching hot terminals is quite unlikely. (Consider too that kids and pets get in to areas that you wouldn't even think about.) In my case, the unit is mounted to the back of a large wooden desk which is pushed against a wall. The overhang gives needed clearance.

Following the schematic, use heavy gauge (remember, your needs may change next year), well

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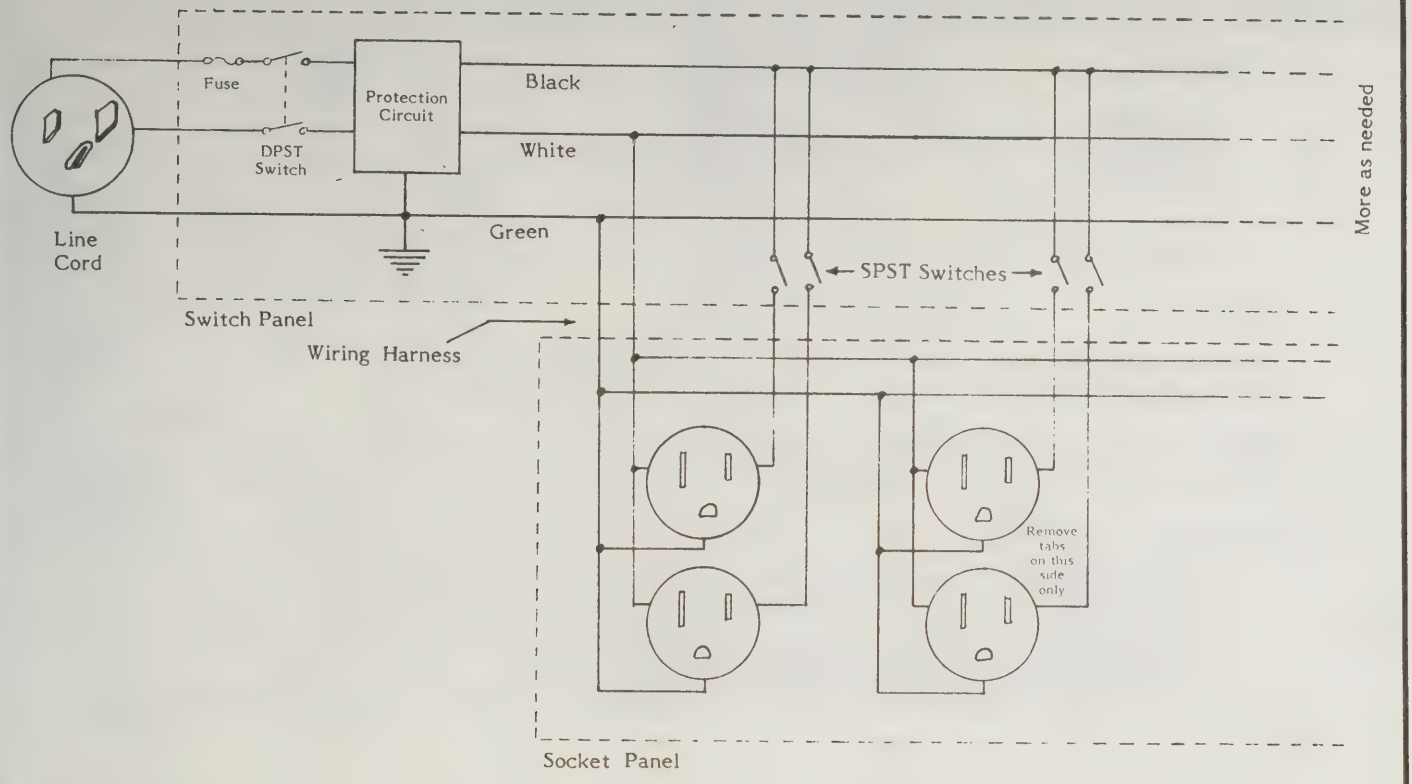

insulated wire to connect each switch to one outlet. Break off the connection tab on the hot side only of each duplex outlet before wiring. The neutral side tabs may be left on as they must all be wired together anyway with one lead running up to the neutral side of your master switch (or protection circuit). Be sure to wire up all the ground connections even if some of your devices only have two prong leads as you never know what changes you may make to your setup in the future. Be sure to label which socket connects to which switch for future reference. For safety, follow all standard wiring conventions as noted in the figure. Tie, tape or bundle the wires into a neat harness when you finish.

After checking and testing the wiring carefully, plug in all of your devices, noting which socket they plug into. Then put an appropriate label on the front of the switch panel next to each switch. All on/off switches *on the equipment* should be turned on and left on.

You can now turn every device you have in your setup on and off from one convenient panel, whether it came with a power switch or not. Devices that you turn on virtually every time you do anything with your system may be even be left on at the switch panel as they will be switched on and off by the main power switch. This main switch should be turned off every time you finish for surge/spike protection.

And for you lazy types who don't mind spending a few extra bucks, DAK Industries at 1-800-325-0800 sells a spike protected box that does everything that I have described for up to 6 devices for $79 plus shipping. This unit also filters your devices from each other.

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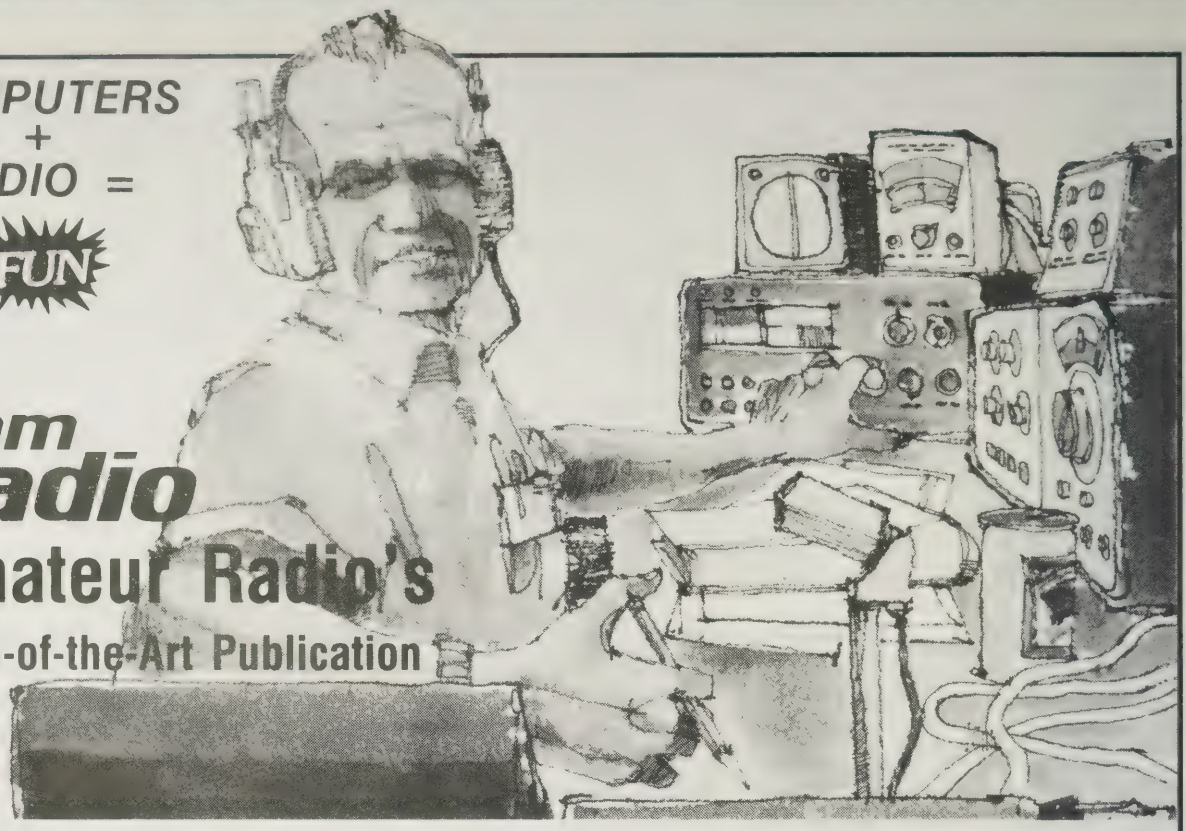

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By Keats A. Pullen, E.D.

Instructions for Plotting Circuit Diagrams

The program devised for use with this task is intended to operate in conjunction with Screen Dump II if a large scale plot is required. The principal reason for using the SDump II is to make available a direct means for outputing the contents of the screen directly to a printer.

This program is designed for use with the TI-99/4A and a Panasonic 1091 printer. It can be used with other printers, but the CHR$(24) may have to be changed to suit a different printer. This command resets the spacing of the lines to eliminate the gap that otherwise will appear between lines of print.

The characters that are redefined are those between 129 and 154 in the ASCII set that are least likely to be reset in case of a change in print. They are reached by use of CTRL and the appropriate letter that they follow. The program can not be used with Extended Basic, but must be used with Editor/Assembler Basic or an error will be reported by the computer at line 143 in the program. You also avoid other problems that can occur using Extended Basic by using the E/A Basic.

It is helpful to plot out exactly what you wish to print on a piece of graph paper having about quarter-inch squares before you start making up the diagram, as otherwise difficulties can be encountered. The print starts at the bottom of the screen and scrolls upward, and only has about 30 elements available horizontally because of the erasures of the line indicator in line 1030 of the program.

Since it is difficult with the 26 characters available to include such symbols as diodes, transistors, tubes, meters, etc. I have chosen to use the small octagon on CTRL A for terminals and to make larger letter in to define special devices. Similar symbols can be constructed for operational amplifiers and digital elements. The user can use his ingenuity for these kinds of devices. The attached typical diagram for the phone-line tester I built recently shows the general idea.

Some of my suggested designations to use in the octagons are listed below:

Where two letters are required, the horizontal segments of the octagon can be made more than one unit long so that the letter combination will fit. Similar techniques will be required with the various digital symbols. In those cases, the designations will be NOR, NAND, INV, etc.

The symbols for O and P are for resistors, and may be used several times to get the appropriate combination. Those for S, T, W, and X are inductances, and laminations are U and V. Q and R are for capacitors.

The somewhat unusual symbols probably can be excused on the basis that these are the only convenient way to build them into a dot matrix printer. It is possible to make somewhat more representative symbols for transistors and for tubes based on these techniques, but the standards committees long since have made this at least incovenient for us. As anyone who has seen my *Handbook of Transistor Circuit Design* will be aware, I made some efforts to get symbols that were more draftsman-friendly representations about 25 years ago, to no avail.

Using the SDump II, one has to be careful not to touch either the FCTN and CTRL or the FCTN and SHIFT controls at the same time to prevent premature dump of the wrong kind. If you do, you may have to start over again!

Keats A. Pullen, Jr. W3QOM
2807 Jerusalem Road
Kingsville, MD 21087 CTM

(Note: This article should have been published last instead of the one that was. I got them out of sequence. This is the first of the series and last month was number two. I am sorry to have gotten them mixed. But, I bet you can get everything straighten out. Chet)

Voltmeter---V	Ammeter---A	Diode---D
Transistor---B	Transistor---F	Emitter---E(beside lead)
Triode---Tr	Tetrode---Te	Pentode---Pe
Switch---SW	LED diode---L	Op Amp---OA
Source---S	Cathode---K	Grid---G
Plate---P	Collector---C	Base---B
Gate---G	Drain---D	

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Tell them where you saw IT!

Continued from page 14

```
160  PRINT : PRINT "   NOW IS YO
   UR CHANCE TO HAVE YOUR OWN"
170  PRINT "GOLD MINE. YOU HAVE
   ONE YEAR TO MINE ALL";
180  PRINT "THE GOLD YOU CAN. TH
   E MOST YOUR MINE IS"
190  PRINT "WORTH IS ONE MILLION
    DOLLARS! BUT YOU"
200  PRINT "MUST MINE IT. YOUR M
   INE CONTAINS 100"
210  PRINT "VEINS OF GOLD. EACH
   VEIN IS WORTH"
220  PRINT "$10,000."
222  VTAB 24: PRINT " << PRESS T
   HE SPACE BAR TO CONTINUE >>"
   ;
224  IF  PEEK ( - 16384) < 127 THEN
   224
226  POKE  - 16368,0
228  HOME : VTAB 6
230  PRINT : PRINT "   TO START
   WITH YOUR MINE HAS JUST ONE"

240  PRINT "VERTICAL SHAFT. YOU
   MUST ENLARGE ON THIS";
250  PRINT "BY MINING. IT TAKES
   ONE DAY TO MINE ONE"
260  PRINT "POSITION, WHETHER IT
    CONTAINS ORE OR"
270  PRINT "NOT. IF THE POSITION
   S HAVE ALREADY BEEN"
280  PRINT "MINED YOU CAN MOVE F
   IVE POSITIONS IN ONE";
290  PRINT "DAY. YOU CAN MOVE IN
    FOUR DIRECTIONS:"
300  PRINT "UP, DOWN, LEFT, AND
   RIGHT. TO MOVE TYPE"
310  PRINT "THE FIRST LETTER OF
   THE DIRECTION YOU"
315  PRINT "WISH TO MOVE AND THE
   N THE NUMBER OF"
320  PRINT "POSITIONS TO MOVE. F
   OR EXAMPLE, TWO"
325  PRINT "POSITIONS UP WOULD B
   E U2, 3 POSITIONS"
330  PRINT "RIGHT WOULD BE R3, A
   ND SO ON."
332  VTAB 24: PRINT " << PRESS T
   HE SPACE BAR TO CONTINUE >>"
   ;
333  IF  PEEK ( - 16384) < 127 THEN
   333
334  POKE  - 16368,0: HOME : VTAB
   6
335  PRINT : PRINT "   YOU CAN M
   OVE AS MANY POSITIONS AS YOU
   ";
340  PRINT "WANT IN ONE DIRECTIO
   N EXCEPT THAT YOU"
345  PRINT "CANNOT GO PAST THE B
   ORDER OF THE MINE."
350  PRINT "IF YOU TRY TO YOU WI
   LL BE STOPPED AT THE";
355  PRINT "BORDER. YOU CAN THEN
    MOVE FROM THERE ON"
360  PRINT "YOUR NEXT TURN."
365  PRINT : PRINT "   EACH MOVE
    TAKES ONE DAY. ON THE MAP"
370  PRINT "EACH LEVEL IN THE MI
   NE IS A DIFFERENT"
375  PRINT "LETTER, (A-L, AND N-
   U). YOU ARE THE"
380  PRINT "MINER AND ARE REPRES
   ENTED BY THE LETTER"
382  PRINT "M. ALL GOLD VEINS AR
   E SHOWN AS `*`."
384  PRINT "YOU BEGIN AT THE TOP
    OF THE SHAFT."
386  VTAB 24: PRINT " << PRESS T
   HE SPACE BAR TO CONTINUE >>"
   ;
388  IF  PEEK ( - 16384) < 127 THEN
   388
390  POKE  - 16368,0
392  HOME
394  VTAB 12: PRINT "GOOD LUCK A
   ND GOOD MINING"
400  TEXT : FOR AA = 1 TO 20: FOR
   BB = 1 TO 30:X(AA,BB) = 0: NEXT
   BB,AA
410 D = 0:M = 0
420 K$ = "UDLR"
430 L$ = "ABCDEFGHIJKLNOPQRSTU"
440  FOR T = 1 TO 20
450 :::X(T,16) = 1
460  NEXT T
470 :::X(1,16) = 3
480 :::X1 = 16
490 :::Y1 = 1
500  FOR T = 1 TO 100
510 :::Y =  INT ( RND (1) * 20 +
   1)
520 :::X =  INT ( RND (1) * 30 +
   1)
530 : IF X = 16 THEN 520
540 :: IF X(Y,X) > 0 THEN 510
550 :::X(Y,X) = 2
560  NEXT T
580  POKE 34,1
590  HOME
600  FOR T = 1 TO 20
610  FOR T1 = 1 TO 30
620  ON X(T,T1) + 1 GOTO 680,630
   ,650,670
```

```
630  HTAB T1: PRINT  MID$ (L$,T,
   1);
640  GOTO 680
650  HTAB T1: PRINT "*";
660  GOTO 680
670  HTAB T1: INVERSE : PRINT "M
   ": NORMAL
680  NEXT T1
690  PRINT : NEXT T
700  GOSUB 1580
710  POKE 34,21: HOME
720  PRINT "    MOVE:  ";
730  INPUT A$
760  FOR T1 = 1 TO 4
770  IF  MID$ (K$,T1,1) =  LEFT$
   (A$,1) THEN 810
780  NEXT T1
782  HOME : PRINT "TYPE D, L, R,
    OR U FOLLOWED BY A NUMBER"
784  FOR I = 1 TO 1500: NEXT I
786  GOTO 700
790  HOME : PRINT "BOUNDRY REACH
   ED"
795  FOR I = 1 TO 1000: NEXT I
800  GOTO 700
810 N =  VAL ( MID$ (A$,2,3))
820 X9 = X1
830 Y9 = Y1
840 Z$ =  MID$ (L$,Y9,1)
845  FOR X = 1 TO N
850  ON T1 GOTO 860,900,960,1020

860 Y1 = Y1 - 1
865  IF Y1 > 0 THEN 880
870 Y1 = Y1 + 1
875  GOTO 790
880 X(Y1 + 1,X1) = 1
890  GOTO 1070
900 Y1 = Y1 + 1
910  IF Y1 < 21 THEN 940
920 Y1 = Y1 - 1
930  GOTO 790
940 X(Y1 - 1,X1) = 1
950  GOTO 1070
960 X1 = X1 - 1
970  IF X1 > 0 THEN 1000
980 X1 = X1 + 1
990  GOTO 790
1000 X(Y1,X1 + 1) = 1
1010  GOTO 1070
1020 X1 = X1 + 1
1030  IF X1 < 31 THEN 1060
1040 X1 = X1 - 1
1050  GOTO 790
1060 X(Y1,X1 - 1) = 1
1070  IF X(Y1,X1) = 1 THEN 1140
1080 D = D + 1
1085 D =  INT (D * 10 + .5) / 10
1090  IF D > 365.24 THEN 1210
1100  IF X(Y1,X1) = 0 THEN 1160
1110 M = M + 10000
1120  IF M = 1000000 THEN 1450
1130  GOTO 1160
1140 D = D + .2
1145 D =  INT (D * 10 + .5) / 10

1150  IF D > 365.24 THEN 1210
1160 X(Y1,X1) = 3
1165  VTAB Y9 + 1: HTAB X9: PRINT
   Z$
1170 X9 = X1
1175 Y9 = Y1
1180 Z$ =  MID$ (L$,Y9,1)
1185  VTAB Y9 + 1: HTAB X9: INVERSE
   : PRINT "M": NORMAL
1190  GOSUB 1580
1195  NEXT X
1200 D = D + 1
1202 D =  INT (D * 10 + .5) / 10

1205  IF D < 365.24 THEN  GOTO 7
   00
1210  GOSUB 1580
1215  HOME
1220  PRINT "YOUR YEAR IS UP AND
    YOU HAVE              MINED $
   ";M;" OF GOLD."
1225  FOR I = 1 TO 2000: NEXT I
1228  TEXT : HOME : VTAB 8
1230  REM  DISK COMMAND TO OPEN
   "GOLD.DAT" AS FILE
1240  GOSUB 1530
1250  IF C > M THEN 1400
1260  IF C = M THEN 1380
1270 D = 365.24
1290  REM  ROUTINE TO READ CLOCK
    AND DATE
1300  INPUT "HEY OLD TIMER. WHAT
   'S YOUR NAME";N$
1305  PRINT : PRINT : PRINT
1310  REM  DISK COMMAND TO OPEN
   "GOLD.DAT" AS FILE #1
1320  REM  WRITE N$
1330  REM  WRITE D
1340  REM  WRITE M
1350  REM  WRITE T$
1360  REM  CLOSE 1
1370  PRINT "WELL ";N$;" YOU JUS
   T BROKE";
1375  GOTO 1410
1380  PRINT "CONGRATULATIONS!!!
   YOU TIED";
1390  GOTO 1410
1400  PRINT "YOU DIDN'T BREAK";
1410  PRINT " THE RECORD"
1412  PRINT
```


Tell them where you saw IT!

```
1415  PRINT "OF $";C;" MINED IN
   ";B;" DAYS"
1418  PRINT
1420  PRINT "BY ";M$;" ON ";R$
1425  FOR I = 1 TO 1500: NEXT I
1430  GOTO 1600
1450  FOR I = 1 TO 1000: NEXT I:
    TEXT : HOME
1455  PRINT "CONGRATULATIONS !!
   YOU HAVE MINED A      MILLION
    DOLLARS IN ONLY ";D;" DAYS!
   "
1458  PRINT : PRINT
1460  REM  OPEN DISK FILE #2
1470  GOSUB 1530
1480  IF B < D THEN 1400
1490  IF B = D THEN 1380
1500  GOTO 1290
1530  REM  ROUTINE TO INPUT M$,B
   $,C$,R$,B.AND C TO FILE 2 AN
   D THEN CLOSE IT
1570  RETURN
1580  VTAB 1: HTAB 4: PRINT "DAY
    ";D;"    ";: HTAB 20: PRINT
   "PROFIT IS ";M;"    "
1590  RETURN
1600  FOR I = 1 TO 2000: NEXT I
1620  PRINT : PRINT : PRINT
1630  INPUT "WOULD YOU LIKE TO P
   LAY AGAIN ";A$
1640  IF  LEFT$ (A$,1) <  > "N" THEN
    RUN
1650  HOME : VTAB 12
1660  PRINT "WELL THEN. ITS BEEN
    FUN ";N$
```

The above program was submitted by Pandora Software. They have a catalog of over 4000 Public Domain programs available at a cost between $.15 to $.25 per program. All programs run on the Apple II computer. All programs are copyable and listable. There are 54 categories to choose from. They will be happy to give a FREE catalog to any of you upon request. However, they don't have time to answer questions about the listed programs. They will provide a copy of volume that contains a listed program for $5.00.

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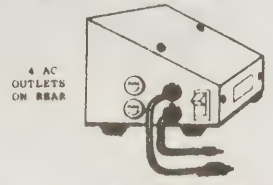

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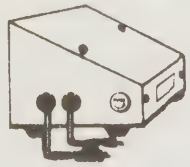

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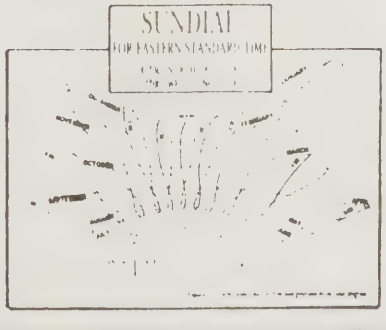

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By J. C. Smith, Jr.

A Review

More Pocket Power

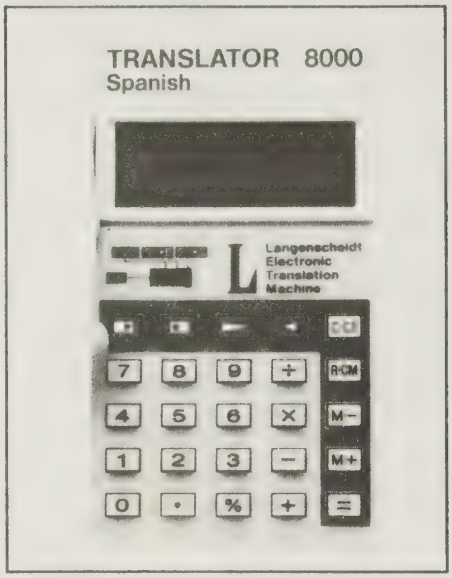
'Langenscheidt Translator 8000' Electronic Translation Machine

This month I am doing a Hardware Review on the 'Langenscheidt Translator 8000' Electronic Translation Machine.

The Translator 8000 is billed by its manufacturer as an "Electronic Translation Machine". In my opinion, the name is a little grandiose, but I can understand why someone would call it that. After all, it's not common to see a small bilingual dictionary packed (along with a calculator) into a 2.625"x4.5"x.375" package weighing only 2.5 ounces. This is the result of a joint effort between Sharp, a Japanese electronics firm well-known for its line of calculators, and Langenscheidt, a German publisher with a worldwide reputation for bilingual dictionaries. In addition to the German model I reviewed for this article, Langenscheidt produces Translator 8000's for French and Spanish. The list price is $69.95.

The Translator 8000's display uses liquid crystal technology, and is capable of showing nine letters or numbers. One pleasing side effect is that in calculator mode, numbers look like numbers instead of the stick figures one associates with seven-segment displays. There is a switch on the back of the Translator 8000 which lets you adjust the display contrast.

The calculator mode is selected using the on/off switch found beloow the display. Two more switch positions let you use the Translator 8000 in either the English-to--German or German- to-



English mode. There is an auto-shutoff feature in case you forget to turn the unit off after you use it.

The Translator 8000 comes with a carrying case, a 48-page instruction book, and a 14-page leaflet of tips for the user, including expressions for travel. Both booklets fit inside the case, and closed, the whole package is only 3/4" thick.

The calculator part of the Translator 8000 is a common, 8 digit, four-function, calculator with one memory.

The electronic dictionary holds approximately 8,000 words, which were selected by the Langenscheidt editors to be of use to students, tourists, and business people. They are accessed by switching the unit to the correct language "direction" (G->E or E>G), and then using the ABC1 and ABC2 keys to enter the first and second letters, respectively, of the word to be translated.

Keeping either key depressed causes the alphabet to be rapidly displayed in the respective letter position.

Once you've got the first two letter displayed, you press the "->" key to start the search. You then keep pressing this key (or keep it depressed) until the desired word appears in the window. You then press the "=" key to get the translation. Pressing the "M+" key scrolls through the Translation nine characters at a time. Pressing the "=" key again gets you back to the original word.

The search keys will take you through all the words that start with the letters selected by the ABC1 and ABC2 keys, and then loop back to the beginning of the group of words. For example, if you are in E->G mode and select "GA" as the first two letters, you will start with "GAIN", go on through to "GATHER", and then loop back to "GAIN".

There are two potential difficulties in implementing any bilingual electronic dictionary. One is, how to handle words with multiple meanings--like "capital", which could mean a city or money. The second is, how to convey necessary grammer information to the user. The Translator 8000 performs both these functions, displaying a small two-directional arrow to indicate another meaning, and a compact set grammatical information in parentheses after each word.

Tell them where you saw IT!

Two additional features enhance this unit's performance past that of a mere bilingual-dictionary-in-ROM. First, there is a TEST button, whcih causes a word to be selected at random and displayed on the screen. This in effect turns the Translator 8000 into a flash card machine, allowing you to drill vocabulary virtually any place. Second, up to 16 word pairs can be stored in memory and recalled at will, so that selected vocabulary can be "worked on" separately from the TEST function.

I really found it difficult to find some serious flaw with the Translator 8000. My one major complaint was that the word for "mustard" was not included in the vocabulary. In any case, when you take account of what the Translator 8000 was designed to do, you can't really complain to much about the limited vocabulary and the awkward procedure of finding and reading a word. And although I thought the price is a little steep, I think it is worth the money.

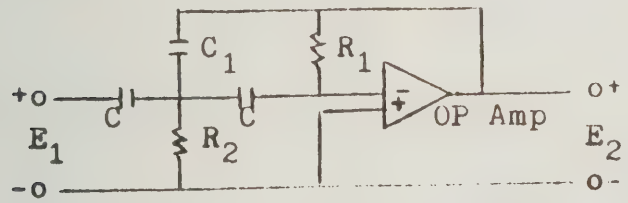
For further information Contact:
Langenscheidt
46-35 54th Road
Maspeth, NY 11378

Now, let's get to this month's program. It is called "Active High-Pass Filter".

Listing 1: Is a Description.
Listing 2: Is the Program.
Listing 3: Is an Example.
Listing 4: Is a Sample Run.

Listing 1:

Description of an active high-pass filter.



$$\frac{E_2}{E_1} = \frac{-H_o S^2}{S^2 + \alpha w_o S + w_o^2}$$

$$R_1 = \frac{2H_o + 1}{\alpha 2\pi f_c C}$$

$$R_2 = \frac{\alpha}{2\pi f_c C\left(2 + \frac{1}{H_o}\right)}$$

$$C_1 = \frac{C}{H_o}$$

$$H_o = \frac{C}{C_1}$$

```
∝= 2S: Peak coefficient
S: Damping coefficient
fc (Hz)
Ho (in times)
C (uF)
```

Listing 2:
Program

```
10 INPUT "INPUT fc(Hz)=",F,"INPUT
   "HO=",H,"INPUT C(uF)=",C,"INPUT
   a=",A
20 C=C/1E6
30 B=2*π*F
40 PRINT "R1=";(2*H+1)/(A*B*C),"R2=
   ";A/(B*C*(2+1/H)),"C=";C/H
50 GOTO 10
```

Listing 3:

Example

f_c= 100 (Hz)

H_o= 10 (in times)

C = 5 (uF) ∝=1

Listing 4:

Sample Run

```
RUN
   INPUT fc(Hz)=?
100
   INPUT HO=?
10
   INPUT C(uF)=?
5
   INPUT a=?
1
   R1=6684.50761
   R2=151.5761363
   C=5E-07
```

Well, that's it for now. I hope you enjoyed this month's article and program listing. Please send any comments and or questions to me at the following address:

Joe C. Smith, Jr.
P.O.Box B-36085
Florence, AZ 85232-9998 CTM

Your Letters

Letters

Letters

Likes CTM

Dear Chet:

Enclosed you will find a check for $18. Please send me **CTM** for another great year of READING!

How about a continuation of the IBM article for us PC users. I sure could use an explanation on file.

Thanks again for a job well done. I hope to have a BBS Packet system running in the Lancaster area NY state soon.

73

Dick (Dukat)
Lancaster, NY

Thanks for the renewal Dick. I am trying to find more IBM writers and with more requests from others like you, I may be able to get more. As you know I try to give the readers just what they want. That has been the main reason for ***CTM*** *from the start. To please our subscribers and to that end, I think our writers have done a great job. Thanks for the note ...Chet*

Pleased Advertiser

Dear Chet:

It was nice to see you and Teenie at the Knoxville hamfest on May 23rd. Sorry that I was not able to get away from my booth to talk with you at more length.

I won twelve past issues of your magazine given away as one of the hourly drawings. Since I have returned and with no changes to make in my computer programs that market, I had time to do some reading and this gave me a chance to browse through the **CTM magazines.**

You sure deserve a pat on the back for publishing such informative computer programs that are ham related. Your long hours and dedication show in the improvement seen from the magazines published a year ago to those of the more recent issues. Also enjoy the Chet's Chats and the letters from your readers. The Hamfest calendars are of course an interest to me as a dealer.

I look forward to a long relationship with your company as an advertiser.

I can relate to the problems of typs's since my programs contain about two million bytes. Still find misspelled words or an extra space where it should not be.

I think the name **CTM** is just fine for the title. Good luck in the furture and our paths will surely cross at another hamfest.

I remain

Bob Lanz, N4ISL
The Lanz Company
Louisville, KY

Bob, thanks for the letter of encouragement. Yes, there has been a tremendous change, for the better, of ***CTM*** *over the past year. It is amazing how proud I am of each issue then as time goes by, I look back as older issues and think how poorly it looks. I guess and I hope that is normal and I just want each issue to be better than the last.*

The greatness of the magazine is a direct input of our writers. As I have said many many times, our writers won't have to take second seat to any writer in any of the other magazines. It is they, not me who make ***CTM.*** *I just put it all together. I hope your ad will bring in many new dollars for you. I know you have made great improvements in your programs, since we looked at them some time back. Chet*

Needs Help

Sir:

I am attempting to locate software/hardware for use of the Timex/Sinclair 1000 with Ham Radio applications such: Packet

Tell them where you saw IT!

radio, RTTY, AMTOR, Code translations etc. Any products.

Thanks
Paul Koutnik
5400 Park Ave.
Downers Grove, IL 60515

Paul you should write and subscribe to QZX magazine at 2025 O'Dennell Drive, Las Cruces, NM 88001. I am sure they will be able to help you.

Perhaps many of our subscribers will also be able to help. Chet

Likes Bob Hoover's Articles Who Doesn't?

Dear Chet.

This is a letter to saya thanks for the excellent series of articles by Robert Hoover on the Commodore C-64 12 volt conversion which I recently completed.

Every now and then someone very special comes along who makes an unselfish contribution to the benefit us all. Bob's technical genius has been a great advantage to the many of us yachtsmen who are now involved in the world of computers and ham radio's. The 12 volt conversion makes a compatable, efficient, and extremely usable tool onboard any vessel for normal as well as the potential for emergency usage.

Many of us in South Florida are involved in packet radio weather disemination as well as normal BBS(ing) and QSO's.

Thanks from all of us and keep up the good work. You have a fine publications.

Craig A. Harnden, KI4DN
Miami, Florida

Craig, you are but one of many who thinks the same thing about Bob. He is a prince among writers. I am so glad to have him writing for our subscribers. Our subscribers really get the most for their dollars with ***CTm*** *thanks to writers like Bob.*

As I said above, our entire writer force is second to none. There isn't any way I could name them all but as a subscriber, you know them anyway. Thanks for writing and I do hope others will take time out and write our writers. Chet

Tony Likes Us from DownUnder

Dear Chet:

Please find enclosed my cheque for another years subscription, which I gladly send off as your magazine has been such a great help to me.

You may remember that you published a letter from me in your October 1986 edition, in which I said I had a problem in taht several of the overseas companies that I had written to, had not sent a reply back. I also had a problem in that the advertisers did not give overseas postal charges. You took the liberty Chet, of putting my name and address in the magazine in the hopes that companies would write direc.

I am writing to tell you that because of your magazine, all of my supply problems have been solved. Many thanks Chet.!! Since your letter I have been able to order such a stack of reading material tha t I can not keep up, I still have many many hours of reading ahead. I also have a spare keyboard, computer, RAM, and I believe my modem is about halfway between American and Australia at this moment. I have also found a trememdous computer pen-pal in the States who is giving me tons of help and encouragement in computing. I even have an Official Program from the May Indianapolis Computer Fest. How is that for World Wide advertising?!!!

To sum it all up Chet, I would say that if anyone has a problem in computing, they should write in and ask for help. I know there are many very helpful people out there who can help.

Keep up the good work Chet.
Kind regards,
Tony Farrell
4/16 Vickery Street
Bentleigh, VIC 3204
Australia

Tony, I have been telling subscribers for years, exactly what you have said. If you have a problem, write us and let our subscribers help you out. It works doesn't it Tony!

I have subscribers in about 35 plus countries but few take time out and write and I am so glad you are one of the few Tony, Thanks.

Tony, I am going to do it again to you and put your full address and perhaps you will get more letters and pen-pals and who knows, maybe a pen-gal!

Thanks so much for writing and naturally for the renewal. Chet

Another Needs Help

Dear Chet:

Please send me a recent sample issue that would be espceially helpful to someone with an Apple computer (a IIGS). Also, what hardware and software would you recommend for RTTY, CW, PEC and ARQ reception on an Apple? Thank you for your help.

Sincerely,
Daniel Presley
Rt 7 Box 623
Sand Springs, OK 74063

Readers *Daniel isn't a subscriber but he does need help. If you can answer his questions, he my subscribe. Regardless, help Dan if you can. Chet*

A Subscriber has problem with subscription

Dear Chet:

Apparently my subscription is still not straight on your records. After my letter of a month ago (copy enclosed) you promptly sent me a May issue with a personal note of apology enclosed in the same envelope. However I have not received the June issue and I guess the July one should soon be in the mail.

I trust you can straighten out this snafu, for I do enjoy the various articles on the Sinclair computers. I am also enclosing a label off my January issue for your reference.

Sincerely,
Ruth Fegley
Baltimore, Maryland

Ruth, I am so sorry for the problems you are having. I just can't seem to get your subscription correct. I remember the problems I had last year and I think it was the (side door) at that time. As you kow by now the June/July issue was one and this is the August issue you are reading. Again from my memory, when I started working on the T-S Horizons subscriptions list, I think I remember your name. If that is the case then you will be receiving up to 6 more months on your subscription. I think you had 4 months left on that subscription.

Look at your label this month and you can tell. I think it will be something like 0988 or something close to that. Thanks for writing Chet

Another happy subscriber

HI, Chet!

To take the improtant business out of the way firs, attached you will find my check for $18.00 for renewal of **CTM** , as it appears that I will run out in September.

Sorry you missed the Sinclair Fest in Indianapolis. It was an up and coming affair. I fully enjoyed it; spent more that I should (as usual); learned a lot, and am looking forward to next year.

I am slowly getting double disks drives for the ZX-81 setup. You would think that a retired person would have time to do the things they want to do -- wait till you try it!

I do have disk drives on my 2068, on which I have an amber monitor, but am having some trouble getting them to work. They did, but now when the disks are connected, the text on the screen becomes faint and fragmented. Will have to contact Aerco and see if they have any suggestions to correct it. The drive has an independent power supply.

My latest spluge is an IBM Compatible (an Ultra-Comp) which came from St. Louis. It has 640K on board, floppy disk drive, a 32 meg hard disk with an RLL card, plus other attachments. Mostly I bought parts and assembled them. Spend a lot of time trying to learn to use it.

I took a couple courses at the Community college in this area last summer which steered me that way, and am planning to take some more this winter.

By the way, the last issue came in a plastic envelope. I thought "Chet is going whole hog" but thin I turned it over and found a sticker saying that the postal department ahd put in that container due to damage while they had it. Funny thing was there was nothing wrong, not even a bent corner. Some that I have received looked as if they had been attacked by a dog.

Keep up the good work.
Roger Higgins
Fort Madison, Iowa

Roger, thanks for your renewal. You may be surprised but I actually remember you clearly. I remember meeting you at the first T/S Computer Fest. ***CTM*** *has changed hasn't it. I haven't come across your name from the T-S H list but I bet it is there.*

I sure had planned on being in Indianapolis but at the last minute I just couldn't get away from getting the issue out. I get caught up in that web too often. I wish I had a solution but I don't. The only way I think I could get caught up is if all of the writers would send more than one article so I could nearly put two out a month and get on schedule. I am trying though...

Why don't you do an article on your ZX-81 and 2068 and let us all know how you did it and what the problems were and how you overcome them. I know I have hundreds of subscribers who would be interested. After all, now I have the T-S H subscribers, I am the largest and only monthly publication for T/S. Oh, yes, Computer Shopper has Mark Fendrick's "T/S Survival" column. And, he does a great job but a 500+ page magazine with one page for the T/S computes isn't too much. Maybe I can get Mark to write for ***CTM****. Wouldn't that be great! I still have great plans for* ***CTM*** *it just takes time and support from our writers.*

Thanks again for the renewal and your words. Chet

Beta Basic

Dear Chet:

For those of your readers who followed the series on BETA BASIC, it may be of interest that a version 4.0 for the Spectrum 128K is now available. It is included on the same tape, along with version 3.0, and a manual for both for a delivered price of 15.95 British pounds. For those who have only the 48K Spectrum or an Emulated TS2068, version 3.0 may be ordered by itself for the old price of 15.50 British pounds.

For the convenience of anyone who does not have MasterCard to order directly from Beta Soft, 92 Oxford Road, Moseley, Birmingham, B13 9SQ, England, they may send a postal M.O. made out to me for $27.50 in U.S. funds ($26.00 for version 3.0 only) and I will forward their order for direct shipment to them from England. Turnaround time is usually within about four weeks. I still hve the BB 3.0 demo available for $5.00 to cover the cost of the tape, postage, and packaging.

Some features of the 128K version of BB 4.0 are instantaneous exchange and access of RAMdisk files, provision for interrupt-driven three-channel sound, much faster DRAW and CIRCLE commands, and a FILL of the entire screen in less than one second, in any texture of UDG character.

With best regards,
Bob (Hartung)
Huntertown, Indiana

Tell them where you saw IT!

Bob, thanks for the information. I would imagine many of our subscribers will take you up on your offer.

Also, think much for the fine articles you have sent and the current ones. You have been and one of the most efficient writers we have. Your articles have been greatly received and I know they will continue.

Your work with the young must give you great pleasure and satisfaction. Thanks for your support. Chet

Subscriber Got Help

Dear Chet:

I wrote sometime to find the availability of male edge card connectors. I got a response form a person (thanks) on how to etch my own. Then I gor a call and this letter on a company that can supply them. Mabe you would like to pass this along.

Thanks again for your help in this matter.

J. B. Crawley
Campbellsville, KY

Dear Mr. Crawley,

As per our telephone conversation today, this is a response for you to pass on to **CTM magazine.**

Although our primary business is aligning and repairing all brands of 5-1/4" floppy disk drives, we also sell drives (the most reliable on the market because our personal alignment is far better than the manufacturer does on an assembly line). So we routinely make 34-pin extension ribbon cables for various installations using the male connectors you're looking for.

Therefore, you may pass on that we can supply custom ribbon cables having 34, 36, 40 or 50 conductosr using any number and combination of male and female edge card connectors with gold plated contacts. The cost is 45.95, $6.25, $6.50 and $6.95 respectively per connecot plus $1.00 per foot of total cable length. There is a $2.00 shipping and handling charge for up to three cables and Virginia resident s must add 4.5% sales tax. Order from:

Mini-Floppy Center, Inc.
Attn: H. Winter
1215 Norview Avenue
Norfolk, Virginia 23513

We don't accept credit cards but will ship UPS C.O.D. if desired. Cables are not returnable (unless defective or not as ordered) and therefore phone orders are not accepted because assembly specifications are too easily misunderstood by untrained office workers. A customer's sketch with type and placement of connectors is required. We will sell the connectors separately but customers are reminded that special tools are recommended for reliable assembly.

Sincerely,
Harry Winter

J.B. Thanks for the letter and information. Many of our subscribers probably have, like you, needed from time to time cables and this company just may be the answer. I am glad we were able to help you originally from your letter. Thats the reason we include full address for some of the request. That way, answers can come from different sources. Thanks again and good luck and God Bless... Chet

Indianapolis HamFest a smash

Dear Chet:

Thank your for the donation of the subscription to **CTM**, and the magazines. I'm sorry you didn't win but it was worth the money to try.

Naturally the magazines went very fast, we decided to put them at the prize booth and let the fellows take them. They turned out to be the most popular item there. **CTM** is the only magazine that I read thoroughly and is more in tune with what the amateurs are doing.

Briefly the Indy Hamfest was a great show. The weather was just about like last year except we were spared rain on Saturday. It rained at about 2:30pm on Sunday, but things were winding down about that time any way. Thank goodness we are almost entirely under roof.

We had a record gate and that provides funds to make Indy even better.

Indiana Hams will be involved in the PAN AM games starting in August, the number of volunteers in the Ham community has been so great that they out numbered the jobs that needed to be done. When it is over I would like to send you an article on it.

Thanks again for your support and keep up the good work with **CTM.**

Sincerely,
Wm. J. Evans, WB9BEN
Indianapolis, IN

Bill, I am glad your hamfest was a success. Sorry we couln't be there but since it was the same time as this years Atlanta, we went to Atlanta 150 miles away. Please keep us in mind for next year though. Maybe we can make it then.

I hope you will send in an article on the PAN AM games after they are over and you hve the time. And, please don't forget pictures. They really help make an article. Take care and God Bless... Chet

Likes CTM but... Not the printing problems

Chet:

Congrats on the progress with **CTM** -- nice expanding coverage -- fine stories -- very useful.

one problem: You printing quality is terrible. pages 13, 14, 15, 18 are totally illegible -- The story is SUPER -- the accompaning diagrams cannot be read.

A shame to have Bucks story rendered useless because of non-readable graphics!!

Otherwise, Chet, you have a fine publication which should enjoy good growth and popularity.

73
Ken Miller, K6IR

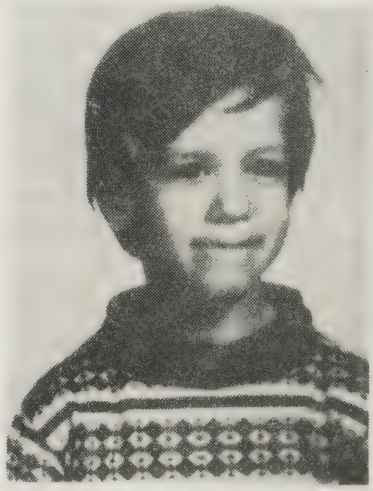
Continued on page 97

Have You Seen These Missing Children?

GABRIEL MINARCIN
Sex: Male DOB: 10-14-82
Race: WhiteEyes: Brown
Hair: Brown Wgt: 60 lbs

APRIL ANN COOPER
Sex: Female DOB: 5-13-79
Race: White Eyes: Blue
Hair: Blonde Wgt: 60 lbs

PAMELA MAYFIELD
Sex: Female DOB: 7-10-79
Race: Black Eyes: Brown
Hair: Brown Wgt: 50 lbs



LOUIS MACKERLEY
Sex: Male DOB: 2-15-77
Race: White Eyes: Blue
Hair: Blonde Wgt: 44 lbs

Contact National Center for

Missing & Exploited Children

(800) 843-5678

Tell them where you saw IT!

Coming Events

Each month we publish names, dates and other information for Computer Expos and Hamfest and other events we feel you may want to know about. We will not be held liable for mistakes i.e., wrong dates or other information as given to us. Our sole liability is to reprint the correct information.

AUGUST

1 - 2 - WCARS Hamfest - To be held at the WNC Agriculture Center across from Asheville Airport, Asheville, NC. Take I-26 to Exit 9) from I-40 Take I-26. Free admission, RV parking, fly-ins welcome - plenty of parking spaces. For additional information contact Brce Ponder, N4MTC, 65 Old Starnes Cove Road, Asheville, NC 28806 (704) 667-3496

2 - Porter County ARC Hamfest - To be held 49'er Drive-In Theater, Rt. 49, north of Valparaiso, IN. Gates open at 7:am (open at 6:00 am for Vendors). Surrounding area attractions are beautiful Dunes State Park near scenic Lake Michigan, Mink Lake Golfing across the road, several lakes to fish, boating, camping and an amusement park for the kids. VE testing for all classes of licenses, free parking, admission 43.50 per person (children under 12 free). Talk-in on 146.775/175 MHz and 145.45/144.950. For further information contact Rich Stahl, K9LBO, P.O. Box 1782, Valparaiso, IN 46383

***1 - 2 - 14th Greater Jacksonville Hamfest-** The Jacksonville, Florida hamfest will be held in a new location this year at the **Prime F. Osborne Convention Center.** Will will have room for over 700 swap tables and 50 exhibitors. The new center is fully air conditioned. 850 parking spaces available and esy access of I-95. For additional information please contact Barry Baines, WD4ASW, Greater Jacksonville Hamfest Association, P.O. Box 10623, Jacksonville, FL 32207 or call (904) 350-9193

***7 - 9 - Ark-La-Tex Hamfest** - will be held at the Shreveport Convention Center, Shreveport, LA. This year marks the 25th anniversary for **10-10 International Net, Inc.** and we are very proud to have them with us. This years' hamfest will be a three day affair, beginning at 12:00 noon Friday. For additional information please contact Ark-La-Tex Hamfest, P.O. Box 37632, Shreveport, LA 71133-7632 or Robert Lance, N5GHJ (318) 686-4608

9 - 53rd Annual Hamfest - To be held at Santa Fe Park, 91st & Wolf Road, Willow Springs, IL (near Chicago) Additional info from: John Schipitsch, 13058, W9BNR, 13058 Finch Court, Lockport, Il 60441 (312) 403-1043

15 - Ozark Regional Hamfest '87 - Sponsored by the Southwest Missouri ARC. To be held at the University Plaza Trade Center (Lower Level) Springfield, MO. VE exams and other activities to keep everyone busy. For additional information please contact SMARC, Box G.S., Springfield, MO 65808

2 - Columbia, (TN) HamFest - to be held at the American Legion Post 19, Nashville Highway. VEC exams given. For additional information contact Maury ARC, George Russell, WB4JCR, PO Box 832, Columbia, TN 38402

***15 - 16 - The Huntsville Hamfest '87** - To be held in the von Braun Civic Center, Huntsville, Alabama. For dealer information please call Art Davis, WB4KKA at (205) 883-0477 or other information call Tom Alexander, K5RY, (205) 533-5082

22 - 23 - Computerfest™ '87 - Computer & Electronic Convention & Flea Market. To be held at the Hara Arena (Same place as the HamVention®) at 1001 Shiloh Springs Road, Dayton, OH 45415 (513) 278-4776

22 - 23 - Confederate Signal Corps Inc. Hamfest - to be held at the Holiday Inn in Madison, Georgia. Dealers inside, Outside exhibit space free flea market tailgaters. Talk-in 146.265 & 146.865 MHz. For additional infor please contact CSC, Inc P.O. Box 90159, East Point, Georgia 30364 or call Roy Jordan, WB4ILR (404) 996-4587

SEPTEMBER

***5 - 6 - 1987 Shelby Hamfest** - To be held at the Cleveland County Fair Grounds, Shelby, NC. This is one of the largest hamfest in the country with one of the largest flea markets in the country. For additional information please contact Kenneth H. Blanton, KB4EOO, Shelby ARC. P. O. Box 2206, Shelby, NC 28151-2206

12 - 13 - Mobile (AL) Hamfest - For additional information contact Warren J. Mc Carty, KB4JET, PO Box 7232, Mobile, AL 36607 (205) 865-4404 No additional information available

12 - Uniontown ARC 38th Annual GABFEST - will be held at the club grounds. The club is located on the Old Pittsburgh Road, just off Rt 51 & 119 by-pass in Uniontown, PA approx 40 miles south of Pittsburgh, PA. For additional info please contact John T. Cermak, WB3DOD, 36 Steel St. Republic, PA 15475 or call (412) 246-2870 res.

11 - 13 - The Electronics & Computer Expo - Will be held at the Jacksonville Convention Center, downtown Jacksonville, Florida. For additional information please contact Great Southern Computer & Electronics Shows, PO Box 655, Jacksonville, FL 322012 or call at (904) 743-8000

12 - Ham-O-Rama '87 and Computerfest - To be held at the Niagara Falls Convention & Civic Center, Niagara Falls, NY. For additional information please contact Albert M. Gritzmacher, AE2T, 92 Saxton St., Lockpaort, NY 14094-4346

12 - 13 Mobile Hamfest - To be held in Mobile, AL. For additional information call Warren McCarty, KB4JET (205) 865-4404

12 - 13 - Greater Louisville Hamfest - To be held in the West hall and the Pavilion of the Kentucky Fair and Exposition Center. The Exposition Center is located directly of I-264 and I-65. For additional information please contact Bob Karr, KD4BZ (502) 543-2877 or write to GLHA. PO Box 34444, Louisville, KY 40232

13 - BARS Hamfest '87 - To be held at Santa Fe Park, 91st & Wolf Road, Willow Springs, IL - For additional information contact Ed Weinstein, WD9AYR 7511 Walnut Ave. Woodridge, Il 60517 (312) 985-0527 - Talk-in 146.52

13 - Butler (PA) Hamfest - To be held at the Butler Farm Show Grounds (Roe Airport) , our 10th year.For additional information contact John Varljen, K3HJH, 174 Oak Hills Heights, Butler, PA 16001 or call (412) 283-9403 talk-in on 96/36 (W3UDX), for directions 84/24 (W3WKD)

19 - 20 Superfest '87 - will be held at the Exposition Gardens, W. Northmoor Road, Peoria, IL off 6300 Block N. University. Latest information from Superfst '87, P.O. Box 3461, Peoria, IL 61614 (SASE) please.

19 - 20 - 8th Annual Wichita Amateur Radio Society Hamfest will be held at the Wichita Falls Activities Center on 10th and Indiana Street, Wichita Falls, TX. Air conditioned indoor flea market, commercial dealers, computer dealerss, FCC License examinations. RV Hookups nearby. For additional info please call (817) 723-6500

26 - Anniston (AL) Hamfest - To be held at the National Guard Armory Highway 431N (Ft McClellan Blvd), Anniston, AL. FCC Testing. Talk-in 147.04. for additional information contact Harold Romine, (205) 435-4833

26 - 12th Annual Elmira Hamfest - to be held at the Chemung County Fair Grounds in Horseheads, New York. For additional information please contact Jay at (607) 733-0761

***26 - 27 - Radio Expo** - To be held at the Lake County fair grounds at Rt 120 & 45. Between Chicago and Milwaukee, 4 miles west of I94 Toll-way. For additional information please contact Greg Pietrucha, WB9SNZ, Box 1532, Evanston, Il 60204

OCTOBER

2-Electronics&ComputerEXPO- to be held at the Orlando Expo Centre (FL). For additonal information please contact Great Southern Shows, P.O. Box 655, Jacksonville, FL 32201 (904) 743-8000

4 - Springfield Hamfest and Computer Expo! - To be held at the Clark County Fairgrounds in Springfield, Ohio. 1/4 miles west of the intersection of interstate 70 and Ohio Rt 41 (exit 59) For additional information please contact The Independent Radio Associaton Inc., P.O. Box 523, Springfield, OH 45501

3 - 4 - Virginia Beach Hamfest - Virginia State Convention to be held at the Virginia Beach Pavillion, Virginia Beach, VA - For additional information please contact Manny Steiner, K4DOR, 3512 Olympia Lane, Virginia Beach, VA 23452 (804) 340-6105

10 - Computer - Camera Electronic Show & Sell - to be held at the Memorial Coliseum in Fort Wayne, IN. For additional information please contact: Class Productions, Inc., 4207 N. Clinton St., Fort Wayne, IN 46805 (219) 483-8268 or (219) 483-6144

***9 - 11 Houston Ham Com** - To be held at the Hyatt Regency Hotel in downtown Houston, Texas. For additional information please contact Russell L. Seto or Robert Craig, PO Box 61081, Houston, TX 77208-1081 or call 800-231-2761 and in Texas call 800-392-0783

9 - 10 ARRL Southwestern Division Convention - To be held at the Safari Hotel & Convention Center, Scottsdale, Arizona. Guided tour of Barry Goldwaters, K7UGA shack, full round of activities for all attendees. For full details please contact C. W. Mulkin, W7KB, 6150 E. Harvard St., Scottsdale, AZ 85257 (602) 947-0296

11 - 1987 Maysville Hamfest - To be held at the Maysville Community Center one block from junction of US 17 & NC 58 in Maysville, NC - FCC Exams - For additional information please contact Bob O'Brian, W4YMI, PO Box 3, Pollocksville, NC 28573 (919) 224-6761 or David Jones, WD4LVN, PO Box 7148, Jacksonville, NC 28540 (919) 455-1221 Talk-In 146.52

10 - 11 - Central Georgia Hamfest - To be held in Warner Robins, Georgia. - FCC Exams - FREE Admission = FREE flea market - FREE dealer space - For more information contact CGARC PO Box 2585, Warner Robins, GA 31099 or call Cliff, N6DLA (912) 929-2951

13 - 15 - ROCHESTER Computer & Business Show - To be held at the Riverside Convention Center, Rochester, NY. For additional information contact: Lynette M. Massaro, 135 Delaware Ave, Suite 102, Buffalo, NY 14202, (716) 852-2006 or (800) 633-0181

***24 - 25 Hamfest Chattanooga 1987** - The 9th annual Hamfest Chattanooga Amateur Radio &

Tell them where you saw IT!

Computer Convention (an ARRL sanctioned convention) will be held at Grand Central Station at the Chattanooga Choo-Choo complex. Highlights include license exams on both days, free parking, lodging facilities, and various forums. Amateur exams on Saturday will be given by WCARS/VEC ($4.00) the Sunday exams will be given by ARRL/VEC ($.35) All 610 forms, checks or MO and license copies should be sent to HAMFEST CHATTANOOGA, P.O. BOX 3377, Chattanooga, TN 37404 by Oct 20, 87. Walk-ins will be accepted on a Space A basis. Please bring positive ID & your original license. - 8' blue-ribbon flea market tables are $10/day or $15/weekend (inside) electricity is available. Outside spaces are $3/day or $5/weekend. Talk-in 146.19/79 Mhz. Rooms at the Choo-Choo range from $49 - $65. (single) remodeled Pullman cars are avaiilable for $85 per night. Because of heavy tourist traffic at this time of year, any rooms not reserved by Oct 10 will no longer be held for hamfest visitors. They will be available at the same price on a first-come basis. Call (615) 266-5000 for reservations; specify attendance at Hamfest Chattanooga. - For further info write HAMFEST CHATTANOOGA, P.O. Box 3377, Chattanooga, TN 37404. For exhibitor info call Barbarra Gregory, WA4RMC, (615) 892-8889. For flea market info call Garland Eubanks, KB4RIM (615) 622-8467 after 6:00pm or Joe Duncan, W4ECW, (615) 698-2147

***31 Nov 1 - Ham Radio & Computer Expo '87 -** To be held at the Gwinnett County Fairgrounds, Lawrenceville, GA Just 20 minuts Northeast of Atlanta, GA. (this is the old Stone Mtn Hamfest) FCC Exams - RV sites with hook-ups - For rurther information contact: Expo '87, PO Box 1282, Stone Mountain, GA 30086

NOVEMBER

8 - Fort Wayne Hamfest - To be held at the Allen County Memorial Coliseum in Fort Wayne, IN. - For additional information please contact AC-ARTS Hamfest, PO Box 10342, Ft. Wayne, IN 46851 or call (219) 485-0164 - Talk-In 146.28/88

***14 - 15 - Central Alabama Hamfest -** To be held at the Garrett Coliseum, acres of parking, RV parking with hook-ups, almost unlimited tailgaters parking. For additional information pleace contact Central Alabama Hamfest, P.O. Box 3141, Montgomery, AL 36109

21 - 22 - 7th Annual Greensboro (NC) Hamfest - The 7th annual hamfst is sponsored by the MARK IV Radio Club. at the National Guard Armory on Franklin Blvd. 9am - 5pm. Tickets $4. in advance, $5. at gate New Tailgate Area - price of ticket plus $2. per space. WALK-IN FCC Exams. Free shuttle bus to largest shopping mall on east coast Saturday. Information & registration information from Fred Redmon, N4GGD, 3109 Goodall Drive, Greensboro, NC 27407 - Phone 0100Z - 0300Z, (919) 852-9244. Tickets Only : Henry Hughes, KA4LPA, 2811 Gwaltney Road, Greensboro, NC 27407. FCC Exams: Hugh Brunson, AE4N, (919) 852-1087

20 - 22 - Suncoast Convention 1987 - To be held at the St Petersburg Hilton & Towers, St Petersburg, FL - For additional information please contact FGCARC, Inc. 1556 56th Ave. North, St Petersburg, FL 33703

21 - 22 - FLORIDA GULF COAST ARC HAMFEST - will be held at the newly completely renovated Hilton Hotel. Full round of activities for attendees. Saturady from 9am to 5pm, Sunday from 9am to 3pm. Additional information may be had from Ms. Jean Endicott, 1556 56th Ave. North, St. Petersburg, FL 33703 (813) 525-5178

* denotes those shows **CTM Magazine** will attend as an exhibitor. SEE YOU ALL THERE!

ATTENTION Show Producers!! Send me your 1986 Show schedule and I'll include it in our "Coming Events" section, free of charge.

Operating Events

Nothing listed in this catagory this month

*** This is a new service of CTM Magazine. If there is sufficient interest, it will be a regular feature. Send us information on your SPECIAL OPERATING EVENTS and we will list them here as space permits.**

Continued from page 93.

Rockville, MD

Note: The printed quality of the text is excellent -- The diagrams are the problem.

Ken, thanks for the note and I must agree with you. on pages 13, 14, & 15 but I think page 18 is readable. Not good ... but readable. Just as soon and I got the issue from the printers and saw what you are talking about, I called Buck and told him how bad they were.To say the least, he wasn't happy.

However, in my way of messing up, which I do each month, I included the same diagrams as the large 1/2pg one with the smaller 3 by 3". I duplicated the diagrams without knowing I was doing so. Buck had sent the smaller ones with the original submission but then he felt he could do better with the large ones and I held the magazine open a couple of days until they could get here, put them in (the ones which didn't turn out) thinking I would be helping the subscribers. I was in such a hurry, I forgot to pull the little ones not realizing they were duplicates of

Continued on page 99

Advertising Rates

Subscribers may place one (1) **(FREE CLASSIFIED AD)** each month. Only one item per ad, unless a complete station, or a group of items are being sold. i.e., (one price takes all). These ads are for used personal equipment only.

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COMMERCIAL ADS are only $.20 per word or number. These may be either **NEW and/or USED** equipment, hardware, and **original software** or services etc. No restriction on number of items or words per ad etc. **Minimum cost per ad $2.00** Any ad will be outlined for an additional $2.00.

Ads may be submitted typewritten or printed and double spaced. Ads will be on one side of paper only. Number of ads on page will depend on size of ads.

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Neither Lambert Publishing House or CTM can verify condition or value of items. Therefore, cannot be held responsible for claims made by advertiser. Libility is limited to making necessary corrections in following issue.

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Publisher shall not be liable for any costs or damages if for any reason it fails to publish an advertisement regardless of reason.

All advertisers using Post Office Boxes (POB) MUST provide publisher with full name, home address and telephone number, Without these, the ad will not be published.

As used in this section "Classified AD Rates" the term Publisher" shall refer to Lambert Publishing House.

FOR SALE COMPUTERS & ACCESSORIES

COMMODORE CUSTOM CHIPS. For people who want to do their own repairs... Low Prices on Commodore IC's: 6510-$9.55, 6526-$9.95, 6567-$14.75, 6581-$12.85, PLA-$12.95, 8701-$7.25, 901225, 226, 227, 229-$10.95, and many others (add Postage $)... Heavy Duty Power Supply for the C-64-$29..."THE COMMODORE DIAGNOSTICIAN", newly released diagnostic chart for replacing faulty IC's on Commodore computers/ peripherals. A must for those that want to save money and down time. Reference Aid #4-$6.95. Reference Aid #5 for C-128-$7.95. **Kasara Microsystems Inc.,** 33 Murray Hill Drive, Spring Valley, NY 10977, (800) 642-7634, (800) 248-2983 (outside NY) or (914) 356-3131 (2-2pb)

TS2068HARDWAREEXPANSION PRODUCTS - Expansion board, eprom programmer, cartridge board, printer interface, floppy disk interface, and more! S.A.S.E. for catalog. **THE JOHN OLIGER COMPANY,** 11601 Whidbey Drive, Cumberland, IN 46229 (1-3pb)

TIMEX TS-1000 With 16K, Memotech keyboard, $75. TS-1000, 2K with "Chicklet" keyboard, carrycase, $35. Add Shipping. Much TIMEX, ATARI (8-Bit), POCKET COMPUTER (Tandy/Sharp) software, books, magazines, cameras. Pocket Computer Tax Organizer program cassette $11.95 ppd. S.A.S.E. for list. Zwillenberg, 475 Richmond, Maplewood, NJ 07040 (2-2p)

Public Domain Software for HAM RADIO For Atari, 8 bit computer, $10.00. per disk. For a copy of listing, send a S.A.S.E. with return postage to Howard S. Bacon, 213 Holly Ave., So. Pittsburg, TN 37380 (1)

Color SSTV on the ATARI - See August '85 QST Magazine for details. Our model #107, kit $37.80, Assembled and tested only $54.95, Program Disk $10.00. Add $2.50 shipping per order. For INFO SASE (large) **A & A Engineering,** 2521 W. LaPalma #K, Anaheim, CA 92801 (714) 952-2114 (3-3p)

IBM-APPLE-CP/MComputer Program "HAMLOG" Full function, menu-driven, edit, log, auto segregates. Over 16 modules. SASE CTM- Sandoe, PO Box 2015, Peabody, MA 01960 (12-24p)

SOFTWARE New - WRITE AWAY by Midwest Software Associates, $30.00; **WORD HANDLER II,** Silicon Valley Systems, New, never opened $25.00; All software for the Apple][+ computer. May work with Apple IIe Contact Chet at **CTM Magazine**

WANTED COMPUTER EQUIPMENT

XEROX 800 Electronic Typing System technical information or schematics needed. Terry Thompson, Box 935, Dania, FL 33004-0935 (305) 920-1909 (1p)

Desparetely need a copy of the owners's manual for "IMP" Impact Printer Commodore compatible by Fidelity Electronics. "Name Your Price". John Skubick, K8JS; 791 106th Ave. North, Naples, FL 33963 (1)

HAM EQUIPMENT FOR SALE

SMARTBATTERYCHARGER for gell-cells or lead acid batteries, by Warren Dion, W1BBH. See June '87 QST Magazine for circuit details. Complete kit, nothing else to buy, only $49.95 plus $3.50

Tell them where you saw IT!

s/h. Order #150-KIT **A & A Engineering, 2521 W. La Palma, Unit K, Anaheim, CA 92801 (714) 952-2114 (2-2p)**

MFJ DELUXE POWER SENTRY monitor SWR for three rigs with one piece of equipment. Maximum power limit, THREE SENORS included. Only $75.00 Includes shipping contact Chet at **CTM** (205) 854- 0271

CODE PROGRAMS Apple/C-64. 37 Modes: Drill, Practice, Print, Teach. 1-100 WPM, Graphics, Lessons, Menus, Word Processor, etc. **LARESCO,** P.O. Box 2018, 1200 Ring Road, Calumet City, IL 60409 (312) 891-3279 (1-3p)

HAM EQUIPMENT WANTED

Nothing for this category this month **CTM**

Continued from page 77

the big ones. They all are duplicated except for figure number 1. The strange part is that Buck thought the larger ones would be better, but as you know, they were not. The information for figure 1 is there but you just have to dig it out of the smaller diagrams.

Buck and I talked this over in Atlanta at the hamfest and we think we will have corrected the problem. Normally when poor copy comes in, the printer will make PMTs with a yellow filter which will darken the printing.

Most of my poor quality are the programs and listings from the Timex/Sinclair users and writers.

*Now, for the good news, I hope. I am looking for a scanner now that will allow me to scan written text and diagrams and then I can enhance them through some of the paint programs for my MACs. I also need a scanner for photos and there isn't a scanner on the market, that I can afford, that does both, graphics and photos. I have been advised by several friends who are in the retailing business to hold off buying a scanner for a few more months. Getting the scanner is just one of the many improvements I have in mind for **CTM**. I just have to wait until the time, and price, are right for me.*

*You may be interested in knowing, we lost less money last year than we have in the first 5 years. So, if the Good Lord is with us, we should break even or perhaps even make a little this year. I sure hope so, it is fun doing **CTM** but it isn't fun doing it at a loss!*

Stay with us Ken, you will be glad you did. . . Chet

Writer Writes Letter to Editor

Hello Chet,

Well with $2000. worth of computer, $500. word processor. I didn't listen when the computer kept telling me that I was misspelling *Solvonics*. Well guess what? I was. The correct spelling is, "**Sovonics.** Note there is no **"L"** in the word.

Next time I'll listen to the computer!

Also, if there is enough interest. I'll redo the artwork for the battery topper. Anyone interested in seeing this done, please drop me a line.

Mike Bryce, WB8VGE
Massillon, Ohio

Mike, Isn't is strange how we are. I too, have not accepted computer advice in certain matters, thinking I knew more thatn the computer, but alas, I too was wrong. And the computer got the last laugh, no that isn't true, our subscribers did!

I must admit, I am still confused over the missing artwork for the "Battery Topper" article. I sure don't remember seeing it.

I do enjoy your articles on solar power and looking forward to the ones using the wind and then the others you have planned.

I am so pleased to have you on board. . . Thanks Mike. . . Chet

CTM

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Tell the Advertisers Where You Saw Their AD!

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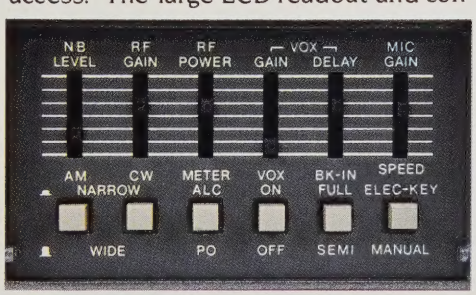

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